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WITH

INTERNATIONAL ABSTRACT

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ARCHIVES OF
PHYSICAL THERAPY, X-RAY
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VOL. IX JULY, 1928 No. 7

PRESENT DAY STATUS OF PHYSICAL METHODS IN SURGICAL DISEASES*

GUSTAVUS M. BLECH, M. D.
CHICAGO

The pages of medical history are filled with rejections of innovations which proved a boon to suffering mankind and, strange as it may seem, with uncritical acceptances of others which proved to have little if any merit.

All conscientious surgeons are ever ready to accept any procedure which promises to lessen operative risk or to supplant operative therapy. Proof for this is the fact that from time to time eminent surgeons have sought measures of safety, to say nothing of the constant agitation against what the late Nicholas Senn has so aptly termed *furor operativus*.

Doubtless it was Bier of Bonn, now of Berlin, who, more than any one else, has stimluated the use of physiologic methods in surgical therapy. In his famous monograph, "Hyperaemie als Heilmittel," he has overthrown the old humoral pathology and has lighted the way for biologic thinking. To this day the artificial production of passive (venous) hyperemia is the treatment par excellence in many joint infections, especially those due to the gonococcus, his so-called mixed hyperemia, produced by suction, reduces the intensity of operative intervention in certain suppurative processes, such as puerperal mastitis, to comparatively simple procedures, while active (arterial) hyperemia by dry, heated air has proved of great benefit in non-suppurative inflammations of variable character.

Bier did not formulate theories until he had undisputable proof of therapeutic effectiveness—for after all it is clinical experience which dictates scientific theories—proof, which has been verified in countless cases by competent, unbiased observers, yet these simple methods have been neglected in favor of innovations, the superiority of which has not yet been demonstrated by scientifically acceptable comparative tests.

The status of the x rays and of radium as therapeutic agents in malignancies is too well known to require discussion on our part. It may be remarked, however, that the use of the x rays for benign tumors of the uterus has been discarded by the overwhelming majority of gynecologists as illusory, and a similar fate befell Apostoli's method of treating uterine fibroids with galvanism.

Hydrotherapy, massage, rest, exercise, climatotherapy and similar physical agents have acquired therapeutic citizenship on a solid scientific foundation so long ago that it would be like carrying coals to Newcastle to discuss their relative merits.

We shall, therefore, restrict ourselves to a review of the present day status of diathermy and ultra violet radiation, because the addition

*Read at the sixth annual meeting of the American College of Physical Therapy, Chicago, Nov. 3, 1927.

of these two agents to our armamentarium has raised physical therapy in popularity, though for a number of perplexing reasons both agents are still being ignored by the ultraconservatives in our ranks. When a dignified scholar and master surgeon like Howard Kelly speaks of electrocoagulation as "the newer surgery," when a pathfinder like Crile comes out strongly in favor of diathermy as a valuable means of preventing and overcoming surgical shock, one would imagine that every surgeon would hasten to familiarize himself with this agent and try it in suitable cases, but the fact remains that many opponents still scoff at the use of the high frequency current as a species of semi-scientific charlatanism and claim that the time-honored methods of applying heat to the body and thermocauterization will accomplish all that is needed.

Though men like Bernhard, Rollier and others have shown the value of heliotherapy in surgical tuberculosis, one can still find many general hospitals without a suitable quartz light and an extensive canvass of the offices of many of our able surgeons will discover no other equipment than is needed for consultations and minor surgical manipulations, a notable exception to this being the urologic surgeons.

It is believed that sufficient time has elapsed and that sufficient material has been accumulated to arrive at a proper evaluation of these two agents.

As is or should be known, diathermy can be applied diffusely, differing from the usual methods of applying heat externally therein that the degree of heat can be regulated to any desired degree for any length of time and can be made to affect superficial and more deeply situated structures or viscera, while the same energy can be concentrated to destroy any desired amount of tissue by cooking-coagulation, or even charring-carbonization. With a special arrangement the high frequency current can be made to cut tissues almost as exactly as is done with a sharp scalpel, the current at the same time sealing the capillaries and smaller bloodvessels and thereby lessening the amount of bleeding usually encountered in classic surgery.

It is but natural that the last named characteristics have caused the most fantastic claims in the lay press, to such an extent that the uninitiated were made to believe that operative surgery was about to become an obsolete art.

We know from Bier's investigations that heat produces arterial hyperemia and this factor suggests the use of diffuse, or as it is commonly designated, medical diathermy in a number of inflammatory conditions of a surgical character.

To sum up our personal experience we feel certain that it is a valuable aid in the management of fractures, dislocations, distortions and traumatic synovitis because pain is relieved, the inflammatory processes are reduced so that passive exercises may be undertaken at a much earlier period than is usually the case.

We have tried this agent in acute and subacute non-suppurating arthritis of non-traumatic origin with satisfactory results, and have made good use of it in the late stages of suppurative arthritis to prevent anchylosis. We have not used it in acute suppurative arthritis because of the theoretic fear of embolism, though this may be unfounded.

The claim by a number of writers that diathermy favorably influences adhesions has not been verified in five cases of postoperative abdominal adhesions. Two had adhesions following cholecystectomy, two followed appendectomy for suppurative appendicitis, one had undergone laparotomy for large ventral hernia at our hands. These patients were frankly told the experimental character of the treatment and they were willing to do anything to prevent reoperation. Although we had subjected these patients to protracted treatment no improvement was noted and all had to undergo operation, during which we observed that diathermy had had no influence whatever, either on band-like adhesions or on the broad sero-serous intestinal adhesions, a finding, by the way, which seems to indicate that the word diathermy is a misnomer, because the heat does not go through, as the word implies. Perhaps the word endothermy more properly characterizes the creation of heat within the tissues.

We have tried diathermy in a fairly large number of cases of non-bleeding peptic ulcer and the patients expressed the conviction that they obtained much relief. This, however, must

be taken with a good deal of reservation, for in the first place an absolute diagnosis without an autopsy in vivo is always problematic, and in the second place no one can tell how much the dietetic and medicinal measures are responsible for the improvement.

Diathermy applied for prolonged periods between attacks of biliary colic in several cases has had no influence on the attacks. Cholecystectomy terminated their sufferings definitely.

Satisfactory results have been obtained in nine cases of indolent ulcers of the leg due to varix, but a good deal of patience is needed, as progress is slow indeed. There is no doubt that diathermy improves the circulation, thereby favorably influencing the ulcers. The length of time required makes this treatment prohibitive in patients compelled to earn a living, under which circumstances we prefer operative therapy.

In the field of urology we have had a very limited opportunity for observation as far as the common malady gonorrheal urethritis is concerned. We have been asked to look after a few patients who were unable to get rid of their "goutte militaire," and the majority claimed to have had diathermic applications over extensive periods. We have also seen a number who have been treated by diathermy for acute gonorrhea without much improvement. Inquiry reveals that some urologists have uniformly good results while others, equally capable men, admit frequent failures. Probably there are technical errors underlying these failures, but as this work is not being done by us we cannot very well pass an opinion. We have, however, tried diathermy in chronic prostatitis. Our very first application direct to the prostate by a special applicator resulted in a burn. Since then we used the simpler method of sending the current through the prostate by external block tin electrodes with fairly satisfactory results. We have also been called upon to treat two patients for small caliber urethral strictures. Relying on the authority of several European writers we applied diathermy through the urethral sound. It was noted after about ten minutes treatment that the sound passed the obstructions much easier than we experienced when we used the sound mechanically, but we cannot assert that we have shortened the course of treatment.

During the last winter a number of women came in complaining of acute catarrhal cystitis and we divided them into two equal groups. One was given the classic treatment without diathermy and the other the same treatment plus diathermy. The therapeutic results were about the same.

We had an interesting case in which diathermy failed completely. We had to perform nephrectomy on the left side, the remaining kidney being normal in every respect. Shortly after the operation the patient began to complain of pains in the right kidney Nothing abnormal could be detected except that the urine diminished in quantity. We explained this as a compensating hypertrophy which caused pressure on the capsule. Basing on the labors of Kolischer, who has shown the favorable influence of diathermy in certain forms of nephritis, we used diathermy daily, but without any result whatever. Splitting of the capsule finally had to be resorted to and the pains disappeared and the quantity of urine increased within twenty-four hours.

Concentrated, or as it is generally designated, surgical diathermy is, of course, of special interest to surgeons on account of its operative features. We omit from our discussion such superficial lesions, as warts, nevi, acne, and similar "blemishes," except to point out that properly used electrocoagulation requires no special aseptic precautions, that the technique is simple and consumes only a few seconds and that the cosmetic results are better than by surgical removal. We have tried to destroy a number of keloids and while we have thoroughly removed every lesion, the keloids recurred in a few weeks or months. Possibly electrocoagulation followed by applications of radium will yield better results.

We are indebted to Dr. C. C. Collins for a number of patients with epithelioma of the forehead, face and lower jaw. In all clean resections were performed by electrocoagulation with and without the use of the cutting current. The results have been invariably good in accord with

the experience of Wyeth, Clark and others, and it seems that surgical diathermy has its greatest triumphs in the accessible, malignant neoplasms. Of course, too little time has elapsed to enable us to say whether recurrences will be averted, but as about six months have already elapsed since a number of such cases have been operated on, we are prepared to say that metastases have not yet made their appearance. The sealing of the capillaries and smaller bloodvessels through coagulation, theoretically at least, justifies the hope and belief that malignant cells are not inoculated into the structures beyond the area of operation, as is often the case when these growths are removed by the knife.

The electro-dissection method has been used by us in one case of scirrhus of the mamma. The operation proved conclusively that the current seals the smaller vessels, for we had to use only a relatively small number of hemostats. But when it came to dissecting the axillary glands we resorted to the scalpel, because here we felt the dissection should proceed under direct control of the eye. We are well aware of the fact that given a very fine needle electrode by which to direct the current and a finely adjusted spark gap, clean dissection is possible, and the question arises why we did not employ the current throughout the entire operation. The answer is that the technique is not quite so simple as is generally believed, that the current must be maintained uninterruptedly to attain perfect success and that we did not feel equal to the occasion, that is we were afraid to injure a nerve or bloodvessel and preferred the slower but surer method until by prolonged practice we shall have acquired the necessary dexterity. About three months have elapsed since the operation and so far everything is satisfactory.

V-shaped excision of the tongue for carcinoma was made by us on a young man two months ago. This patient is a reserve officer who takes his commission seriously, which is one reason why he refused partial amputation of the tongue. We sutured the wound with silk and had the satisfaction of seeing healing by primary intention. He is being treated with the x rays as a precautionary measure.

We have tried electrocoagulation in a case of adeno-carcinoma of the rectum. The elderly and somewhat anemic patient was first seen by us when we had about begun the use of physical methods in surgical conditions and as examination showed that the carcinoma involved the entire sphincteric part, we proposed preliminary colostomy and radical excision of the rectum. This was absolutely declined. He agreed to electrocoagulation and we asked Dr. Kobak to aid us. The operation in itself technically difficult, was performed under trying external circumstances. The immediate after effects were practically nil. But soon after the process spread to the left buttock and about three months later we coagulated again, using both needle and disc electrodes. For a while there appeared to be some improvement, but the inroads on the patient progressed unmistakably. The stench from an open sore in the buttock being unbearable, electrodissection of the buttock was proposed and accepted, but just as we had destroyed about half the involved area the curtain was rung down on the drama. The general anesthetic was too much for the poor fellow. Such a case is very discouraging. Electrocoagulation may have much better results if the patients could be seen early enough, but this, unfortunately, will seldom be the case, as the patients themselves do not seek medical advice until the disease has progressed to a large extent.

Leaving this sad picture we may be permitted to invite attention to the cures brought about by Bordier of Lyons, of carcinoma of the hands in x ray workers and to the splendid results obtained by urologic surgeons in limited papilloma and even cancer of the bladder, often without having to perform a preliminary cystostomy, the work of Gustav Kolischer of Chicago being representative in this particular field.

In gynecology electrocoagulation is the method of choice for the removal of urethral caruncles. The difficulties connected with healing of these annoying little growths after careful excision and suture are too well known to need emphasizing. With electrocoagulation the results are all that can be desired with the additional advantage that the operation can be performed in one's office.

We have had excellent results in the treatment of fissures of the rectum. The technique is very simple, often simple sparking of each

fissure for a few seconds being all that is needed. Topical application of an analgesic makes the operation painless and as dilatation of the rectum is not necessary, hospitalization can be avoided.

Theoretically, as well as practically, hemorrhoids of all sorts can be treated successfully by electrocoagulation under infiltration analgesia. The results are far superior than can be attained by the old clamp and cautery method, for the heat does not radiate to distant structures as is the case with the red hot iron or the galvanocautery. We make one exception and that is in thrombotic hemorrhoids, when opening of the growth and expression of the clots is the logical procedure.

Before dismissing surgical therapy we may be permitted to point out that in our opinion the indiscriminate use of electrocoagulation of tonsils must be condemned. While we ourselves leave tonsillectomy to specialists, the present tendency of general surgeons to do all sorts of nose and throat operations calls for such a remark. From what we have had occasion to observe, it is evident that electrocoagulation should be restricted to positive indications such as hemophilia or arteriosclerosis which may threaten complications. The removal of tabs left after classic tonsillectomy is best accomplished by electrocoagulation under topical analgesia as a simple office procedure in the routine of after care.

Ultra violet radiation alone or in combination with diathermy has been employed by us for a number of surgical conditions. The most striking effect was seen in the closure of postoperative wounds which had not entirely healed, especially through the occurrence of stitch abscess or some other superficial infection, in this class of cases a very few treatments of about five minutes each sufficing.

The closure of open wounds following bone surgery proved more difficult. We have observed a large number of cases of osteo-periostitis and osteomyelitis, in whom a good deal of after care was necessary. Of course we exclude from this cases due to remaining sequestra or bone splinters. Repair takes place very slowly and while we have had no failure, our technician was compelled to treat every case of uncomplicated osteomyelitis after operation for a number of months. It seems to us that we could have attained similar results by simple antiseptic dressings.

Gratifying results have been obtained in tubercular, cervical adenitis of children. We have been fortunate enough to see a number of children whose suppurating glands had been incised at the hands of general practitioners, whose condition had been pitiable for a number of weeks. A few treatments sufficed to change the general and local aspects of the case to the extent that the parents readily consented to extended courses until complete restitution took place. We have seen unoperated tubercular adenitis of the neck with large, soft and chains of smaller glands improve under light treatment in two or three weeks, treatments being given at first every other and later every day. In five to six weeks the little patients could not be recognized for they gained in weight, looked bright and cheerful, competing with their normal sisters and brothers in open air games.

A recent case of undoubted embolic pneumonia may not be without interest to show the efficacy of ultra violet radiation. The patient, a young woman, underwent a simple appendectomy and made an uneventful recovery when on the eight day she began to cough and otherwise developed a typical picture of pneumonia. The objective phenomena were not quite decisive, but as the sputum proved negative on microscopic examination the diagnosis of embolic pneumonia seemed justified. The gravity of the case was such that we suspected that a latent tuberculosis had been lighted up by the ether, for which reason we did not try diathermy while the patient was in the hospital for ten days after the first onset.

The condition improved somewhat and the patient was sent home, but cough, pains in the chest and night sweats continued unabated. The facies was bad. It seemed to us that in spite of the rather negative findings physically we confronted a profound toxicosis of some sort and we began general radiation. After three treatments the picture changed radically for the better, and at this writing the patient continues to improve in every way.

The above sketch represents our own limited experience except when stated otherwise. We have, of course, selected only such cases which illustrate either success or failure, and where we are not sure that the successes were due to the physical agents we have so stated. From what has been said there can no longer be any doubt that the modalities under discussion have a distinct place in certain surgical conditions.

While the application of diffuse diathermy and ultra violet radiation presents no special technical difficulties, so that any intelligent person can be trained by the surgeon himself, if need be, in a very short time to become a reliable technician, the technics of electrocoagulation and electrodissection are not quite so simple, but a little aid by a competent operator, a few experiments on animals or ordinary raw meat and a little practice on minor growths of a nonmalignant character will enable any surgeon to use these methods with skill and judgment. To be sure, one must become familiar with the contemporaneous literature to learn the pitfalls which constantly threaten the novice.

Neither electrocoagulation nor electrodissection can ever replace classic surgery, and while the field may yet be expanded in certain directions, it is also a fact that unwarranted claims have been made for them in other directions. Additional studies are needed by competent observers to establish the absolute therapeutic indications and then only will we be in a position to formulate definite theories on a scientific basis.

But from the experiences gained so far we feel justified in saying that the physical agents under consideration merit a place in the surgeon's armamentarium, for in a modest way they aid in attaining the classic ideal in therapy—the *tuto, cito et jucunde!*

DISCUSSION

Dr. Gustav Kolischer (Chicago): I would like to call your attention to one point, the use of ultra violet rays to subdue beginning infections. In bladder operations the drainage per se may lead to infection of your incision, or if you open up an infected bladder, the infectious material will affect the suture line and lead to very disagreeable breaking down of the incision. This means not only a prolongation of the time of healing, but a severe drain on the patient's resistance. If a slight reddening of the incision appears, a few treatments with ultra violet rays will usually prevent marked inflammatory swelling and often produce a normal condition within a short time.

Starting from these experiences, we make the application of ultra violet rays as a routine measure after any incision for the purpose of opening the bladder. We have done that only for two years and the time is too short to make definite statements. It seems that the breaking down of the incision, the abdominal incision and the incision of the bladder is considerably reduced. I should like to recommend it.

Dr. Smith (Rochester, Minn.): The first thing to consider regarding wounds after operation is to determine what has taken place in the wound or in the abdominal wall.

During the first four days, usually if there is any vomiting or anything of that sort, hematomas are apt to occur. You have to give that length of time before you can really determine what is taking place. It is not well to interfere with a wound in that period because of the possibility of secondary infection which comes from the skin line. It takes a few days, if such has taken place, for an immunity to be established by the body against superficial infections, so that the result would be after four to seven days usually first evidences of infection. Some of those cases can be determined promptly by temperature, but there are some cases that you can't tell and you will never be able to tell whether there is an infection present or not, whether it is due to the catgut or whether it is carried in by the suture line or what not. You will never be able to tell. If it is a low virulency, an attenuated organism, your body resistance will carry it along and you will have practically no reaction. I have studied them in hundreds of cases with a very marked localization; yet culture that and you will never be able to find a thing. If you do find a discharge in an abdominal wound after ten to fourteen days without the cardinal symptoms of redness, induration, inflammation, you can't tell that that wound is infected. If it is, it is a good policy to use heat either from the carbon globes or the infra red.

In tubercular adenitis, superficially in the skin, it is really marvelous to see what ultra violet will do. There is a thing that must be taken into consideration. If you try to treat a wound with a mixed infection with ultra violet light, you are up against many difficulties. Quick results are impossible. What you can do is clean up a wound with the use of the heat and the use of Dakin's. The secondary infection will eventually respond and when it does good results can be had with ultra violet in combatting the tuberculosis.

Dr. Blech (Closing): Dr. Kolischer, of course, is a man who has done a tremendous amount of work. He has been a urologic surgeon for many years. Suddenly we have found he has taken quite a liking for

these agents which men of his stamp, as Kelly and Crile and others, have come to the front with, but as an observing surgeon I have the right to say to you how much is fiction, how much is fancy and how much is truth.

ELECTRICITY IN THE HEAD SPECIALTIES*

ELLIS G. LINN, M. D.
DES MOINES, IOWA

I am, in this short paper, setting out a report of procedure as practiced in our office, and a few of the results attained, but this paper has more to do with technic than with results.

May it be understood again that the usual safe, sane, and helpful procedures as practiced by good men everywhere are always employed in the conduct of our cases.

Regarding the usual general measures and treatments, this paper makes no mention whatever.

All electrodes are soaped before applied. All electrodes are boilable.

In acute pharyngitis with trachial and bronchial irritation, an electrode is employed, fitting snugly over the laryngeal area with short projecting wings widening the contact sufficiently to reach one-fourth the way round the neck; at the same time an extension is continued downward three inches over the sternum. This makes an electrode of fourteen square inches.

Opposite to this on the back of the neck, and continuing downward between the shoulders a somewhat similarly shaped electrode is placed with thirty-two square inches of surface.

By slowly raising the amperage to six or ten hundred, the effect has always proven palliative to the cough and pharyngeal distress and curative to the pharyngitis and the bronchitis as well.

Treatments have been most helpful in these conditions when continued twenty minutes in the more acute cases and twenty-five minutes in those less acute. Twice a day will yield best results, though daily treatments have proven very helpful.

*Read at sixth annual meeting, American College of Physical Therapy, Chicago, Nov. 3, 1927.

Laryngitis with mild or profound aphonia has always been favorably influenced by diathermy. Local medicinal applications are, of course, made to the pharyngeal membrane and to the larynx.

A block tin electrode two and one-half inches high by three and one-half inches wide, or in smaller people, two inches high by three inches wide is accurately approximated over the laryngeal area while a shaped electrode of like material and with twice the contact surface is applied to the back of the neck.

The amperage is then slowly raised to not over 100 per each square inch of electrode surface and is run for twenty-five minutes.

In tonsilitis, after cleaning out the crypts quite thoroughly with a very small curved cotton covered probe, dipped in eight per cent phenol-glycerine, an electrode, so shaped as to accurately fit about the angle of the jaw and with three square inches of contact surface is placed over the inflamed tonsil or one over each tonsil in cases where both are inflamed, and the spark gap opened to slowly raise the amperage to 350.

These treatments are repeated not less frequently than every twenty-four hours.

Identical treatments are applied over the sinuses after negative pressure or puncture or Dowling tampon treatments or whatever care has been determined to be the most helpful.

In all these ailments diathermy has been found to be not alone soothing and palliative, but a more abundant mucous secretion is stimulated, serving to unload the membranes and favorably modify the turgescence present.

For all these applications, the generally accepted rule of 100 milliamperes to the square inch as a maximum is safe and effective.

The duration of treatments, while flexible, is most satisfactory when prolonged to twenty minutes.

In the application of diathermy for the relief of catarrhal impairment of the sound conducting structures and alike for the tinnitus generally present, the years of continuous use have convinced me that it is a very helpful measure.

While presenting in this paper no detailed data, nevertheless I am glad to make the positive statement that my records are very convincing as to the helpfulness of diathermy in faulty hearing and tinnitus resulting from this cause.

May I report very briefly from average cases taken at random, all more or less annoyed with tinnitus, all chronic, all of catarrhal origin, all with reduced hearing and all slowly progressive.

These records may be duplicated by anyone who will exercise like care and deliver his currents at the seat of impairment. The external meatus is always first filled with a good conducting fluid.

The horse shoe shaped extra aural block tin electrodes, together with sectionally insulated meatal electrodes, remain in position fifteen minutes, the amperage running at near 400; after which the meatal electrodes alone remain in position and are continued at near 100 for five minutes. This is followed by the sinusoidal current for two minutes.

My conviction is very firm that to obtain the best results the current must reach the tympanic cavity and tympanic structures through direct conductor contact with the drum head and the inner third of the walls of the meatus at maximum temperature that can be readily tolerated, and that will not produce a vertigo.

Zinc ionization in chronic suppurative otitis media has proven just as beneficial where treatments could not be given according to the regularly designated technic, as when it was so utilized. I find no objection whatever to repeating the ionization a considerable number of times where improvement has been tardy. Between delayed ionizations the ear is regularly cleaned and dressed.

For enlarged inferior turbinals and, in a few instances of enlarged middle turbinals that were particularly prominent and were pressing against the septum, a contact surface three m.m. wide and ten m.m. long is placed firmly against the anaesthetised area and held for six or ten seconds. It is then moved to an adjacent area and applied. In this manner as much surface is covered as it is desired to permanently reduce. The amperage required is 500 to 700. This procedure approximates a suggestion by Doane and we have employed it with satisfaction.

By using longer electrodes of different shapes for fifteen seconds, we easily destroy the pendant posterior end of polypoid inferior turbinals and have destroyed polyps about the pharyngeal end of middle turbinals. All these procedures have the great advantage of having no hemorrhage whatever and the patient at once returns to his work.

In well established iritis and in irridocyclitis diathermy has been of benefit locally applied. A shaped block tin contact of size and form to be placed within the margins of the socket and rest upon the eye lids is adjusted snugly. One hundred or 150 ma. are run for twenty minutes. We have had the satisfaction of seeing one posterior

Case	No. of Treatments.	Time Days.	Heard Watch Before.	Heard Watch After.	Gain Inches.	Gain Per Cent.	Tinnitus Before.	Tinnitus After.
E. R.	6	35 days	R. 26 in.	56 in.	36 in.	100%	1 yr.	None
			L. 2 in.	11 in.	9 in.	450%	3 yrs.	Mild
M. F.	24	19 days	R. 15 in.	42 in.	27 in.	175%	1 yr.	None
			L. 10 in.	40 in.	30 in.	300%	2 yrs.	None
F. J.	30	180 days	R. 7 in.	42 in.	35 in.	500%	3 yrs.	None
			L. 7 in.	40 in.	37 in.	525%	3 yrs.	None
M. G.	35	120 days	R. 20 in.	36 in.	16 in.	75%	2 yrs.	Mild
			L. 40 in.	60 in.	20 in.	50%	1 yr.	None

synechia break down while on the machine, and although this, of course, only chanced to occur just at that particular time, diathermy has seemed to be always of distinct assistance to the mydriatic in accomplishing this result as well as being a very helpful measure for the general eye condition.

The water cooled ultra violet light has proven very serviceable in corneal ulcers and conjunctival infections.

A very active serpiginous ulcer was completely controlled by three ultra violet treatments and only four applications in all were made. Corneal treatments are made through quartz rods, no light being permitted to fall on the central field of vision.

A very stubborn and quite extensive leucoplakia yielded completely to the water cooled ultra violet light and occasional applications of chloracetic acid lightly applied. Repeated treatments were required over several weeks.

I completely failed to cure a corneal herpes, although it seemed at times to be much benefitted by the irradiation.

May I be permitted to report a line of work which, while altogether experimental and altogether new, may nevertheless prove to have merit.

I had been endeavoring, without success, to close two perforations of the drum head by mildly excoriating the margins of the perforations and applying euthymol, after the suggestion of Hazeltine.

After evident failure I succeeded after two treatments to one membrane and three treatments to the other by the following procedure:

After mildly excoriating the margins of the perforations with a minute pledget, moistened with chloracetic acid, I dipped a thin pledget of dry cotton, large enough to a little more than cover the perforation, into a dusting powder, working as much of the powder as possible into the pledget of cotton.

When this pledget was well filled with the powder it was then exposed for three minutes to the water cooled ultra violet light at four inches. The irradiated, powder saturated pledget was then placed snugly but lightly against the membrane, entirely covering the perforation. Three drops of euthymol were then dropped into the ear three times a day for five days, when the dressing was removed and an identical application was again made. It may be normal saline will serve quite as well for the purpose of keeping the pledget moist as the euthymol.

One perforation required two applications, the other three, when they were completely closed with a tissue, in appearance somewhat resembling the normal, but evidently less substantial.

The particular dusting powdr used is pronounced by its makers to contain protoplasm and nucleoplasm rich in nuclear material. It is said, too, to contain a small per cent of peptones. May there then be some justification for the hope that any vitamin activated by the irradiation and any possible nutritional values present, may be appropriated by the cells on the denuded margin of the perforation and built by them into a rapid local repair.

I am reporting these cases only because I failed to close the perforations by previous efforts and succeeded quickly by the means reported. Of course no one would be so indiscreet as to report these results as establishing a treatment for perforations of the drum head. They are only reported that any who care to may try it out.

DISCUSSION

DR. WILLIAM A. LURIE (New Orleans, La.): We must be grateful to Dr. Linn for his pioneer spirit in telling us some of these unique experiments in getting the heat to points where one distinctly wants them. As to the idea of the use of irradiated dusting powder, I have had no experience with it, but it is undoubtedly true that that is a vegetable compound that may carry with it the effects of irradiation.

We have heard Dr. Linn say some of the patients were treated twice a day. I am heartily in favor of what might be considered cumulative effect of physical measures. I believe that we ought to watch our cases more thoroughly and develop a proper sequence of treatments from different agents. After we have had the necessary result from one form of treatment we can readily change to another, whatever the indication may be, without loss of the beneficial effect of the initial treatment.

DR. ELLIS G. LINN (closing): In the cases of impairment of the sound conducting structures referred to in the discussion I examined some of the cases after three or four years. I found this to be true. If the treatment resulted in the hearing having been brought up to 20 inches, the next year it would be found to be improved to 22, 24 inches, the next year it would be 26 or 28 inches, and then at the end of the fourth year it would be still receding from the ear. I don't know whether that would really hold true in a large series of cases. If it would, it would establish the fact that once having set up a recession of the impairment, that recession continues. I thank you.

VITAL PROBLEMS IN TEACHING PHYSICAL THERAPY*

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Within the past few months, the writer visited a small hospital in the Middle West, since he had heard that certain electrical equipment had been recently installed. The physician in charge was a man of general intelligence and skill. When I said to him "I understand that you have a high frequency machine," his reply was "No, not that, but we have a *diathermy* machine. We use it according to the directions that came with it, but are not sure that we get very good results." Here was a physician of intelligence, but one who had made no study of the principles underlying electrotherapy. He was using a potent agency with only the faintest conception of its physics, its indications, or its physiological effects. He had, of course, studied thoroughly the chemistry of calomel, epsom salts, quinine, potassium iodide, and similar drugs. He had been taught for many years the accepted usage of the usual agencies of the materia medica. But here he was employing an agency new to him, of which he had no knowledge. Apparently, he had taken no time to study his apparatus, but was using it according to the label on the mysterious bottle! Can we wonder why he secured doubtful results?

Another experience recently came to me; a very estimable colleague of mine purchased a high frequency machine, or a diathermy machine, he didn't know which. Questioned as to his experience in its use and his results, he said something like this: "Oh, it's fine; I got it because it's the fashion, you know, and I turned it over to my office girl who got a few directions from the agent. She works it all right. I have not much time to use it myself, but it is good, sure! made $35 with it the other day!" And so dollars and cents seemed to be the criterion of success. Instances like these might be multiplied indefinitely. Fortunately for the medical profession these illustrations of ignorance and reprehensible practice are observed less and less frequently, but still there are far too many evidences of empiricism and lack of knowledge in the administration of physical therapy. The field as a whole is comparatively new. It is safe to say that not one of us was taught physical therapy in the college from which we graduated. We have gained our knowledge "on the wing," so to speak. The manufacturers have done their part, often with doubtful argument and a superabundance of enthusiasm; and yet we must give them credit for their sincerity and for the stimulation of general interest in physical therapeutics, which they have brought about. We have picked up our knowledge in no small part from some very good books which are available; (several of them written by members of this society) from magazines devoted to physical therapy exclusively; and, I am glad to say, from articles in the Journal of the American Medical Association and other journals, which are coming to us with increasing frequency, thank the Lord! And again, we find such meetings as these veritable store-houses we may all enter and secure our predigested pabulum. It is clearly our duty to ourselves, to the profession, and to our patients, that we cultivate assiduously the attitude of the earnest student, with effort not spasmodic, but continuous. It is only thus that physical therapy will arise to take its place with other branches of the medical and surgical arts.

*Read at sixth annual meeting, American College of Physical Therapy, Chicago, Nov. 2, 1927.

We all remember the day of the peripatetic physiotherapeutic philosopher, who travelled about, hither and yon, from Dan to Beersheba, with elaborate advertisement of his courses, this heralding invariably done by some commercial house. Likewise his salary was looked after, more or less munificently, by the same commercial concern. These vivid lectures may have been good, bad and indifferent. It has fallen to my lot to have heard only the two latter varieties. Perhaps there were good ones; some very estimable gentlemen undertook them; but the flavor of commercialism, like Banquo's ghost, would not down. It is safe to say that the day of these commercial courses has passed peacefully away.

Clearly, the teaching of physical therapy is a function of the medical colleges; and it is gratifying to state that within recent years the colleges have awakened to a realization of the importance of providing for their students adequate instruction in physica ltherapy subjects. A dozen or more important colleges nd universities might be included in this list.

Dr. Frank B. Granger, in a recent issue of the Journal of the American Medical Association has these words to say:

"The paucity of postgraduate and undergraduate instruction in the medical schools has placed the profession at a disadvantage. This explains much of the former medical opposition, for, as has been well stated 'what a man is least up on, he is most down on.' Many attempts, some good, some bad, have been made to remedy this deficiency In general, it is evident that a subject as intricate as physical therapy, and especially electrotherapeutics, requires more study than a salesman's say-so that if switch J is snapped on, and button 606 is used, all the ills that human flesh is heir to will melt and flit away to the general financial benefit of the physician in question. The commercial courses sponsored by numerous manufacturers were equally inadequate. These generally consisted of from eight to twelve lectures—occasionally there was added a so-called clinic week. Some of these reeked with commercialism; others were good, as far as they went. But even here, consciously or subconsciously, there was a natural tendency to evolve a technic which was applicable only with certain features of the apparatus in question. Despite this, most of the manufacturers were actuated by a sincere desire to teach their customers methods by which they might attain good results. Courses of from one to six weeks, sponsored by reputable medical schools are, of course, frankly makeshifts; but they do serve to show the would-be physical therapeutist the breadth of the subject, and to make him realize that all he can hope to acquire in so short a time is familiarity with the purely mechanical details of the technic and the broader physiological groundwork on which, aided by his medical knowledge and common sense, he can attempt to erect his physical therapeutic superstructure. At the instance of the Council on Physical Therapy of the American Medical Association, not only is more attention being paid by the medical schools to postgraduate and undergraduate instruction, but also medical societies are devoting part of their programs to papers on these subjects."

Since we agree that physical therapy should be a part of the curriculum in every medical school, let us now briefly consider the subjects to which attention should be given. First of all, some historical introduction to the subject should be made. The World War gave us unparalleled opportunity for research in physical therapy and in its intensive practice. I may say that in my own classes, I make use of a hundred or so lantern slides made from photographs which I was fortunate enough to take in a large reconstruction hospital in the east, in which I was stationed about a year. These give an illuminating glimpse of the scope of physical therapy and the large variety of cases in the medical and surgical services, in which this treatment was applied. The agencies used in thermotherapy, actinotherapy, hydrotherapy, etc., should all be presented for discussion, and especial attention given to their clinical application and indications for their usage. Electrotherapy in all its branches should be included in the curriculum, and such subjects dealt with as low and high frequency currents, static, their physics and physiological effects. Medical and surgical diathermy should be stressed. By all means, massage and remedial gymnastics should be thoroughly taken up. Therapeutic exercise is usually not sufficiently discussed and explained as an important part of physical therapeutic treatment. It is needless to say that a broad conception of the whole field must be presented to the students, and the course should be made interesting, clear and thorough, with abundant opportunity of observing the work in a department of physical therapy, with its array of clinical material. Enough of the technic should be learned to enable the student to apply the agencies himself in the treatment of diseased conditions, and to understand the rationale of the different proced-

ures. Treatment by x ray and radium properly belong to the department of physical therapy, but these subjects are so specialized that generally they are best done by specialists along these particular lines. Supplementing the course, should be assigned readings in the best physical therapy text books, and other literature. The courses should always be given in part through lectures, and in part by actual laboratory work. The ideal course would last through a semester, on at least three days a week. Positive credit should be given for the completion of the work. The instruction outlined above would at least acquaint the medical student with the important underlying principles of physical therapy, and would give him a fair working basis of whatever practice in this line he may elect to make use of after his graduation.

The difficulties encountered in the teaching of physical therapy are almost always due to an already overcrowded medical curriculum. Each institution will of necessity solve its own problems; but physical therapy should never be left out or curtailed in its instruction to such an extent that the student is left utterly unprepared to make intelligent use of these agencies, so valuable in medicine and surgery. In addition, the work should be required of all third or fourth year men. It seems to us that the medical graduate of today has been neglected by his college if during his course he is given no instruction whatever in these important subjects.

Another function of the medical colleges, it seems to us, is the establishment of post graduate courses in physical therapy for physicians, many of whom are desirous of obtaining such instruction, but the opportunity does not at present present itself. It seems clearly necessary that at least a brief course be offered by colleges, and especially by state universities. These courses might be as short as six weeks of lectures, study, and clinical observation in a physical therapy department, although a longer period of three monthes is desirable. In either case, the instruction and practice will serve merely as a ground work of preparation.

Problems of a different nature arise in the teaching of nurses and physical therapy technicians. I shall mention only briefly at this time what seems a fundamental thing, i.e., the necessity of at least a good high school education or its equivalent. Such subjects as physics, chemistry, anatomy and physiology (at least elementary) should have been studied previously by the technician. Those women students who have taken courses in physical education seem admirably fitted for their beginning work in physical therapy, and many of the best of the aides in the army were graduates of such courses. Their training had been along the lines of anatomy, physiology and hygiene, with especial reference to kinesiology, they were easily prepared to grasp the technic and rationale of electrotherapy, and other branches of the art.

Technicians should be so thoroughly trained that they recognize not only *what* to do and how to do it, but *why* they do it. When the physician has diagnosed a case and prescribed his treatment, the technician should be sufficiently intelligent to administer the agency prescribed in proper technic, and to have a reasonable knowledge of its physiological effects. Technicians should have a clear conception of the general physics of the electric currents, and a fair knowledge of the physical construction of the machines which they are called upon to operate. This conception is often a ghostly shadow in the brain of many technicians. A thorough training is, therefore, a most essential thing.

If I may add a personal word to the members of this college, I should like to urge that each one of you use your influence and give your help in promoting the adequate teaching of physical therapy in medical colleges. The subject is more important than some of our deans and presidents seem to think. If there is a persistent demand for this sort of instruction on the part of the profession at large, a great impetus will be given toward the establishment of chairs of physical therapy in all our medical schools. The trend is surely in this direction. The American College of Physical Therapy may do much to bring about "this consummation, devoutly to be wished."

CONCLUSIONS.

Physical therapy, while having made rapid strides in the past decade, is still in its infancy, although it must be confessed that the infant, already lusty, gives promise of further construc-

tive development and efficiency. In a sense, physical therapy is a specialty in medicine, requiring special study, training and technic; but perhaps in no other specialty is a broad conception of medicine and surgery more necessary. The medical college is the obvious source of instruction; teaching problems differ in no essential detail from those of other subjects, but the method must be thorough, rational, specific and interesting.

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EFFECTIVE ULTRA VIOLET*

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The use of the ultra violet rays in therapy suggests to all the question as to which of the ultra violet rays are effective. A complete discussion of the subject is very lengthy and many factors involved are still unknown. However, some recent experiments have clarified the situation considerably and are worthy of consideration.

In order to fully comprehend the subject it is advisable to consider the specificity of light action. The familiar terms, infra red, visible light, ultra violet and x ray, all apply to what are known as light radiation. They possess the same general properties and travel through space with the same identical speed. Nevertheless they differ greatly in their physiological effects. Thus, to the normal eye, yellow light appears yellow, and blue light appears blue. Infra red rays are not seen at all, but the sensation of heat is experienced. Likewise, ultra violet rays are invisible to the eye, but exposure to certain of them produces a painful conjunctivitis. It is evident that the eyes react very differently to different kinds of light.

The difference between light rays lies in their form. Light rays travel in waves at a speed of 186,000 miles per second. The physicist by elaborate apparatus can measure the distance from the crest of one wave to that of the next succeeding wave of the same kind. This distance is known as the wave length. These wave lengths are real measurable distances and extend from very small value for the x ray to miles of length for the wireless rays. Wave lengths of the visible and ultra violet are so small that it is necessary to express them in ten-millionths of a millimeter designated as an Angstrom unit, named after its originator. Since all light rays travel with the same identical speed, waves of small wave length occur oftener during an interval of time than those of longer wavelength. Hence it follows that as the wavelength becomes smaller the frequency becomes greater.

The difference in the specific action of light rays results from a difference in wavelength. Thus, a beam of light of wavelength 5790 Angstrom units always appears to the normal eye as yellow, whereas the light rays of wave length 4360 Angstrom units will always appear blue. The wavelength definitely characterizes the kind of light.

The ultra violet rays practical for use in therapy constitute the wavelengths 2000 to 4000 Angstrom units. Ultra violet radiation of wavelength shorter than 2000 are known and have been studied, but they are of doubtful value therapeutically because of the strong absorption of air and the low intensity of these wavelengths obtained from available light sources.

The ultra violet radiations between 4000 and 3200 Angstrom units pass readily through ordinary window glass. While this part of the ultra violet has been shown to be of great value to growing plants, there has not as yet been presented any conclusive evidence as to its value to animal life. Experiments by Hess and Weinstock[1] and Hess and Anderson[2] have definitely shown that this portion of the ultra violet can not prevent or cure rickets. Baldwin[3] has found

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that in New York City there exists a definite seasonal variation in the serum calcium of infants, the drop being during autumn when the short ultra violet of sunlight is weak or missing, the lowest point during the early spring months and rising as summer approaches, when the sun's short ultra violet reaches a maximum. Bovie[4] demonstrated that this long ultra violet was of no value in preventing leg weaknesses in chickens and that the chickens could not grow normally unless irradiated with the shorter ultra violet of sunlight or by an artificial light source which produced shorter rays. Investigation of the germicidal action of ultra violet by Coblentz and Fulton[5], and others, has shown that whereas this longer ultra violet is of slight bactericidal action, this action is most pronounced with the shorter wavelengths. It appears then, in view of our present knowledge that the ultra violet radiations which are transmitted through ordinary window glass are of very questionable value therapeutically.

A desire to obtain the benefits of the shorter ultra violet of sunlight in our buildings has led to the development of a number of window glass substitutes.[6] Inasmuch as these substitutes have been devised to admit this effective ultra violet of sunlight into the home it is well at this point to consider the nature of the ultra violet from the sun itself. Accurate quantitative measurements of solar ultra violet radiation at different parts of the world, at different seasons of the year and at different times of the day are not available. The most reliable information has been found by Dorno[7] at Davos, Switzerland, and by Fabry and Boisson,[8] at Marseilles. Dorno's measurements made in the Swiss Alps, where the atmosphere is exceptionally free from dust and smoke, indicate that the smallest (shortest) wavelength detectable from the sun is about 2900 Angstrom units and that this is present only at noon during the month of July. During the winter, in December, the shortest available wavelength was 3080. Not only does the quality of the wavelength present in sunlight vary with the time of year, but also the quantity. In northern latitudes there is about 18 times more ultra violet in the sunlight of a clear July day than on a corresponding day in January. That there exists a very great variation is familiar to all who have witnessed the great sunburning power of the sun in summer as compared to that in winter. Sunburn and tan are due primarily to the shorter ultra violet. The prevalence of rickets in our cities during the winter is also evidence of the lack of the shorter rays in our winter sunlight. Brown and Tisdall[9] found that the antirachitic effect of May sunshine is approximately eight times as great as that of December or January. They also found that whereas there is a slight antirachitic action of winter sunlight in the city of Toronto the effect is so slight during the period of October to March that the benefit to be derived from using sunlight is purely problematical. Inasmuch as Toronto is practically in the same latitude as many of the densely populated cities of the United States their findings would also apply to these areas.

Measurements made in the industrial section of Newark, where the atmosphere is polluted with dust and smoke, have demonstrated that even during the summer months on a clear day there is very little short ultra violet available. This may be taken as an indication that in the manufacturing sections of many cities, the sunlight is largely devoid of health-giving rays. Rainy and cloudy days further deplete the amount of ultra violet received from the sun.

In view of the facts previously discussed it is evident that the value of window glass substitutes is questionable. Especially since a recent report by the United States Bureau of Standards [10] indicates that these glass substitutes undergo solarization, decreasing in transmission for the shorter ultra violet by exposure to the sun, quartz mercury arc or carbon arc. As a result of this action ,a glass substitute which when new transmits 50 per cent of the shorter ultra violet of sunlight may, after a few months' exposure, transmit only 25 per cent. It is evident that this action may reduce the intensity of the light to below an effective quantity.

Furthermore it must be remembered that the interior of buildings are exposed to very little direct sunlight or even skylight. Much of the light which enters is reflected from the construction materials of other buildings, such as stone, brick, concrete and paint, which are

poor reflectors for the short ultra violet of sunlight. Consequently these buildings receive a negligible amount of the health-giving rays and even under the most favorable conditions of the summer months only a small amount can enter even when the windows are open. When a glass substitute which decreases the available ultra violet to about 25 per cent of its original intensity is used it is doubtful whether sufficient ultra violet can be introduced into the room to be of aid to health.

It appears to be fairly well established that the ultra violet of sunlight most effective therapeutically comprises the wavelengths which do not go through ordinary window glass, namely: 2900 to 3200 Angstrom units. The inconvenience of natural sunlight applications and the deficiency of short ultra violet in the sun during the winter months has resulted in the large use of artificial light sources. Some of these sources also produce ultra violet of wavelength shorter than that found in summer sunlight. It is of importance, therefore, while considering the subject of effective ultra violet to examine the effect produced by these still shorter wavelengths.

Hess and Anderson[2] investigated the action of single bands of ultra violet light on the production of the antirachitic vitamin, employing monochromatic wavelengths 2800, 3025, and 3130. The short wavelength 2800, not present in sunlight, was found to be markedly potent, as was also 3025, in the sunlight area. Wave band 3130 had a very feeble action, indicating that it was about at the upper limit of the antirachitic field. In addition they irradiated groups of rachitic rats, maintained on a rachitic diet, by two regions of the ultra violet spectrum, employing measured and equal amounts of ultra violet.

One region extended from 2500 to 2800 Angstrom units, not at all present in sunlight; and the second included 2900 to 3400 Angstrom units. After the applications had been continued during a period of ten days, the rats were killed and examined. Radiograms of the epiphyses and chemical analysis of the blood definitely showed that while both parts of the spectrum exerted curative action, the ultra violet radiations shorter than those of sunlight were more potent in healing rickets than the effective area of solar rays. It appears from these results that the shorter wavelengths produced by the artificial sources instead of being a deterrent, as believed by some, are actually of great value in the treatment of rickets.

It is familiar to all that the shorter ultra violet of sunlight is responsible for the erythema production. It is commonly believed that the facility of erythema production increases with decreasing wavelength and that this accounts for the marked erythema produced by artificial sources such as the quartz mercury arc lamp. Hausser and Vahle[11] have demonstrated conclusively that this conception does not agree with fact. They made a comprehensive study of erythema production and found among other things that erythema was produced primarily by the shortest wavelengths of sunlight (3100-2950) and that the still shorter wavelengths in the spectrum of the quartz mercury arc, with proportionate intensity, produced only a very slight erythema. They found that the intense erythema which is obtainable with a quartz mercury arc is due to the fact, not that the arc produced rays shorter than sunlight, but a greater abundance of short waved rays found in sunlight. Their investigation indicates, therefore, that the short ultra violet produced by artificial sources is not undesirable from the viewpoint of erythema production.

Light, and especially ultra violet light, is known to exert an influence on hundreds of chemical reactions. Since reactions of living organisms are largely of a chemical nature it is permissable to assume that the action of light in animal therapy is primarily photochemical. With this assumption it would follow that all the known laws of phototherapy would hold for ultra violet therapy. The most important of these laws, first enunciated by Grotthus in 1819, states that light energy must be absorbed by the reacting substance in order to produce a chemical change. It is important, therefore, in ultra violet light therapy that the light penetrate sufficiently far into the tissue to reach the reacting substances. The ultra violet, to give value, must either effect changes in substances in the epidermis, which altered substances are absorbed by

the body must penetrate the epidermis acting upon substances in the corium, e.g., the blood in the capillaries.

If the action of light depends on transmission through the epidermis the effective rays must penetrate in an adult at least 1 mm. Hausser and Vahle[11] have investigated the transmission of ultra violet light through tissue. They found that the ultra violet was readily transmited to wavelength 2800 Angstrom units, that an absorption band existed between 2800 and 2650, and that the skin transmitted very well again at 2537 in the very short ultra violet. Their measurements have been confirmed by investigation by Macht, Bell and Anderson,[12] who, making measurements on living dogs, cats, rabbits and human flesh fresh from the operating table, demonstrated that living tissue 3 mm. to 4 mm. thick transmitted radiations as short as 2500 Angstrom units. Quantitative measurements on a living rabbit indicated that under favorable conditions 40 per cent of the radiation 2537 Angstrom units would pass through a layer 1 mm. thick. Blood in a very thin layer was found to absorb ultra violet completely. This latter is scientific confirmation of an accepted theory that the application of pressure in local application of ultra violet in order to dehematize the tissue, increases penetration. It can be seen, therefore, from these two independent investigations, that ultra violet can penetrate sufficiently far to have a pronounced effect biologically.

The ultra violet radiations effective therapeutically, in view of our present knowledge, appear to be confined primarily to the ultra violet of wavelengths shorter than 3200 Angstrom units. In rickets at least the ultra violet rays from the quartz mercury arc lamp which are of still shorter wavelength than those of sunlight, are very effective. These very short rays, while they can penetrate quite readily into the blood of the capillaries, have very little erythema producing and tanning effect.

SUMMARY

1. It has been demonstrated that our present knowledge of the action of ultra violet indicates that the effective wavelengths of ultra violet are those which will not penetrate ordinary window glass, namely: 3200 Angstrom units and shorter.

2. The value of window glass substitutes to transmit this shorter ultra violet of sunlight is questioned because of the limited quantity of effective ultra violet during the winter months, and our dependability on illumination in our buildings by reflection from the walls of other buildings which are poor ultra violet reflectors. Solarization of window glass substitutes further depreciates their value.

3. The effectiveness of ultra violet wavelengths still shorter than those found in sunlight, such as produced by the quartz mercury arc lamp, has been conclusively demonstrated in preventing and curing rickets.

4. It has been indicated that erythema production is confined primarily to the very short wavelengths of sunlight and is not produced to any extent by still shorter wavelengths from the quartz mercury arc.

5. Penetration of ultra violet through tissue has been shown by two sets of independent investigators to be very much greater than previously supposed.

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METHODS OF MEASUREMENT OF ULTRA VIOLET RAY DOSAGE*

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DETROIT

The use of the ultra violet ray has become so widespread that scarcely a doctor's office, and assuredly no hospital, will be found without some type of apparatus for the production and dissemination of ultra violet rays. With this widespread use there has sprung up a vast literature dealing with the physiology, the physics, and the methods of administration of ultra violet radiation. This is as it should be, but when this literature is studied it will be seen that there is a paucity of methods which give expression to methods of measuring radiation. As a rule comparative dosages are given in terms of distance from the burner and time, and naming the type of burner which produces the rays. It takes very little thought to show how inaccurate this method is and how impossible it would be to follow instructions given in these terms. The amount of ultra violet ray produced varies according to the type of burner producing it, whether we use mercury vapor arcs, straight carbon arcs, or iron arcs; the age of the burner; the interposition of materials which transmit more or less rays, and the type of patient on which the ray is used.

It seems self-evident that, just as in the early days of x ray treatment, much blundering about had to be done before a fairly standardized unit was accepted, so more or less blundering will have to be done in the field of ultra violet radiation. None, however, will deny the necessity for a comparative unit of expression, for if one can transmit to his neighbor the definite amount of ultra violet radiation expressed in a definitely known unit, then, regardless of patient, type of lamp, age of lamp, and all the other factors of possible error, the neighbor can, with a fair amount of accuracy, duplicate the given dose. It will be my aim to present to you a review of the scant literature on the subject of dosage and offer a method which is simple and, I believe, satisfactory.

*Read at the sixth annual meeting of the American College of Physical Therapy, Chicago, Nov. 3, 1927.

Leonard Hill and Albert Eidinow (Practitioner, Vol. 115, page 102) state the following: Erythema, with subsequent desquamation and pigmentation, occurs after the human skin has been irradiated with ultra violet rays shorter than 3200 Angstrom units. Erythema depends upon the intensity of the source of ultra violet radiation, the distance from the source of light, the temperature and the individual sensitiveness of the skin. The penetration of ultra violet rays is directly proportional to the wavelength employed. The longer radiations penetrate farther than the short rays. The intensity of ultra violet rays emited from artificial sources of light depends upon the kilowatt energy of the lamp and the material of the electrodes employed. The carbon arc lamps give a large variety of rays of 3000 Angstrom units and less. They state that the minimal erythema dose in a normal white skin usually corresponds to twice the time required for killing a standard culture of infusoria in a standard quartz cell at a temperature of 20 degrees Centigrade. The ultra violet intensity of a lamp and the dose of light employed may be expressed in terms of infusoria killing units. He uses the following plan of procedure to determine his infusoria killing unit: Three small areas of abdominal skin are exposed to the mercury vapor lamp for three and one-half, five, and seven and one-half minutes, respectively, at a distance of 30 inches. This corresponds to two, three and four infusoria killing units. The following day three small areas of erythema are observed and by means of a tintometer the color of the skin is estimated with each dose of light.

H. Bordier has endeavored to establish a method giving a numerical equivalent for the quantities of ultra violet rays capable of producing color changes in a special reagent when irradiated at the same time and in the same manner as the tissues. The following is the method he uses and is dependent upon the property possessed by the ultra violet ray of reducing

silver salts, the quantity of rays being determined by the weight of silver reduced acting on a unit area and on a unit thickness. The weight of silver in a decinormal solution reduced was found to be 1.03 mg. per square centimeter and he evolved the unit of quantity as follows: "The quantity of ultra violet rays which, acting normally on a decinormal solution of silver nitrate of one centimeter thickness, can reduce one mg. of silver per square cm." He measured by means of paper impregnated with a 20 per cent solution of potassium cyanide the various cutaneous reactions to the various doses and expressed these in terms of silver reducing units.

Harry D. Griffith and John S. Taylor report the following results of a series of experiments on the bactericidal power of various sources of ultra violet radiation: The 'power' of the source was in each case measured by the quartz-cadmium photo-electric cell described by the authors and it is shown that very definite and practically useful correlations exist between the cell reading and this typical abiotic action.

METHOD

Cultures were prepared by spreading a uniform layer of an emulsion of the bacteria to be investigated on agar in Petri dishes. The opaque covers of the dishes were provided with two natural quartz windows, through which the exposures were made, two separate exposures being generally possible on one plate. After exposure the cultures were incubated and the resultant distribution of colonies studied. The bacteria employed were staphylococcus albus in the main series of experiments, and the end point was found to be surprisingly definite. Streptococcus scarlatinae was also used in a few cases, but with inferior results as regards sharpness of end point. The lethal exposure could be determined with an error not exceeding 10 per cent. Whole series of experiments were carrid out, using, as far as possible, one emulsion of bacteria, spread at the same time. Where this was not possible the relative susceptibility of the cultures used was estimated and any small difference found was allowed for in comparing results with those obtained from another emulsion.

It was seen that the lethal exposures necessary were generally of the order of three or four minutes at three feet from the lamps, going up to a maximum of nine minutes for the weakest lamp. It was probable, therefore, that the lethal effect of direct heating by the absorption of radiation was negligible. This was confirmed when it was ascertained that the rise of temperature as measured by a thermopile immersed in the culture medium under the quartz window was of the order of three degrees C. after ten minutes exposure in the case of the 800 watt carbon arc, where it would be greatest.

Control experiments showed that there was no sign of activation of the culture medium consequent upon irradiation, as would be expected from the work of Coblentz and Fulton (1925) who found activation only with exposures very much greater than those used in our experiments.

CALCULATION OF RESULTS

The photo-electric power is obtained as described in their previous paper (1925). Briefly, it involves determination of three quantities—the distance from lamp to cell (D) inches, the time of discharge of the cell through the standard range (T secs) and the size of the diaphragm used (A mm.). The photo-electric power is then given by

$$P = \frac{1}{100} \times \frac{D^2}{T} \times \frac{(22)^2}{(A)}$$

The units in which the result is expressed are then arbitrary, analogous to the candle power of an ordinary source. The authors have become accustomed to refer to them as "U. V. candles."

The bactericidal power is defined to terms of that of a mercury arc, which was known to be in steady running condition. Its killing time on a culture distant three feet was found to be four and three-fourths minutes, and its bactericidal power as 32 units to agree with the "ultra violet candle power" measured by the cell. Then, if another lamp D feet away killing in T minutes, the bactericidal power of that lamp is defined as

$$32 \frac{(D)^2}{(3)} \times \frac{4.75}{T} = 16.9 \frac{D^2}{T}$$

The methods used depend on two fundamental assumptions—that the lethal action is proportional to the time of exposure, and that the killing time is proportional to the square of

the distance from the lamp. These are taken as verified to sufficient approximation by the results of Coblentz and Fulton (1925) and of Leonard Hill (1923), over the range of light intensities (1:2¾) involved in this work.

The bactericidal and photo-electric powers agree by definition for the standard mercury lamp; results will now be given showing how far there is agreement in other types of lamp:

	Watts.	*Distance Ft.*	*Killing Time Min.*	*Photo-elec. Power.*	*Bact'i-cidal Power*
Carbon	4500	12	3.5	550	690
Carbon	700	3	8.5	15	18
Carbon		3	9.75	14	15
Tungsten	364	3	2.75	62	55
Tungsten	175	3	6.5	20	23
Mercury A	291	3	4.5	40	34
Mercury B	358	3	4.75	32	32
Iron	400	3	5.75	22	26

Pohle states that on the continent a unit is used (chiefly in German clinics) which we would call one ultra violet unit (U.V.U.) and which represents the dose of ultra violet radiation that produces on the human skin an erythema of medium strength.

The test employed to measure the intensity of the ultra violet radiation is a photochemical reaction described by Bering and Meyer in 1912. It is based on the fact that a solution of hydriodic acid in water frees iodine under the influence of intensive light. This free iodine will give the starch test (blue coloration). The authors mentioned exposed to ultra violet rays for a certain length of time 25 c.c. of a 5.3 per cent sulphuric acid solution and 25 c.c. of a 1 per cent potassium iodide solution in a glass vessel with a quartz window. They added then a few drops of a 1 per cent starch solution as an indicator and titrated the amount of free iodine with a four hundredth normal sodium thiosulphate solution. They called that amount of ultra violet energy one normal dose (one Finsen) which freed a quantity of iodine equivalent to 10 c.c. of four hundredth normal sodium thiosulphate solution. This method was simplified by Keller, who added the starch solution and 1 c.c. of four hundredth normal sodium thiosulphate solution before exposing the mixture to the light. The coloration of the whole solution into blue marks the end of the reaction. He also stated that the reaction is running parallel to the sensibility of the skin; this, however, does not hold exactly true.

Certain precautions have to be taken and the details of the test must be carried out strictly.

The lamp must burn for at least twenty to thirty minutes until its output is constant enough to be tested. Manufacturers usually give from five to ten minutes and it is true that the number of volts and amperes in the burner circuit has by that time approximately reached its constancy; but a chemical test undertaken before one-half hour will not produce uniform results. Some lamps have a hood which can be closed, leaving only a small opening for so-called local treatments. It is not advisable to close this hood at all because electrical conditions in the burner circuit are changed up to 15 per cent. It seems certain that the accumulation of heat in the closed hood is responsible for this change.

In order to be able to carry out the test conveniently a box was built with a window glass in the front wall and an opening on one side. We proceeded then as follows:

1. The lamp burns with opened hood thirty minutes and is adjusted then over the center of the box at a distance of 25 cm. from the burner to the surface of the test solution. It is desirable to have a volt meter and ampere meter in the burner circuit for the control of the volt input, and a rheostat to balance fluctuations, at least for the first measurement, in order to get an idea of the electrical characteristics of the lamp.

2. In a vessel of 100 c.c. content and 5 cm. inner diameter, 25 c.c. of 1 per cent potassium iodide, plus 25 c.c. of 5.3 per cent sulphuric acid, plus five drops of 1 per cent starch solution, plus 1 c.c. of four hundredths normal sodium thiosulphate solution, are placed under the center of the burner at a distance of 25 cm.

3. After one or two minutes, blue clouds begin to form in the solution, which should then be stirred with a glass rod. After a certain time the whole solution will turn blue, and the time required is measured by a stop watch.

Keller has worked out the test in just this form and defines the ultra violet unit as the

amount of ultra violet radiation producing the foregoing reaction. When applied to the skin double the distance as used in the test must be taken.

In all our measurements we have observed the time for the reaction in various distances. We chose 25, 40, and 50 cm. burner surface distance. Then the skin of several persons was exposed for the time measured, but at double the distance. A mild erythema always appeared after from two to five hours, lasted from twenty-four to seventy-two hours, showed a slight pigmentation, and disappeared usually in from ten days to two weeks. By varying the time, we found that 25 per cent of the ultra violet unit will cause, after from six to ten hours, a just visible reddening; 150 per cent of the dose produces a deep red erythema, while 200 per cent causes a disagreeable itching and burning sensation, lasting for days, when given as first exposure on unpigmented skin. This depends also on the exposed part of the body. It is well known that the chest and the abdomen are very sensitive. We chose the upper forearm and anterior upper thigh when comparing the doses.

R. Gassul states that the difficulty of dosage measurement depends upon the uncertain physical and biological factors in ultra violet therapy. Inasmuch as they had no other measure of the absorption of the rays it shows as a biological and therapeutic dose the amount of rays which, in a definite time, showed an erythema. Inasmuch as the number of factors entering into the production of an erythema depends on such a large number of various factors some unit had to be taken in reference to these factors. The two factors that are of the most importance are radiation intensity and degree of erythema. The radiation intensity he estimates by means of the iodine precipitation method as quoted by Pohle. The second factor he considers as the most important. The sensitiveness of the skin and the degree of erythema. In order to determine a proper erythema dose he uses what he calls a dosiphor. This is an apparatus with a lead shield to cut the ultra violet rays. Each section is exposed for from one to seven minutes, giving the different types of erythema produced in from seven to one minute and he uses the following formula: The amount of ultra violet ray is L., the distance is R., the time of radiation T., giving a formula of $L = \frac{Tr^2}{Rt^2} = 1$ unit.

In 1924 Dr. Janet H. Clark presented a method of measuring the intensity of ultra violet light which seems to me to be by far the simplest method yet presented. She based her experiments on the work of Dr. A. H. Pfund, who found that lithopone is practically insensitive to wavelengths of light longer than 3200 Angstrom units and that from 3000 to 2300 the sensitivity is practically uniform. Lithopone shows no perceptible darkening when radiated through ordinary window glass which cuts out wave lengths shorter than 3200 Angstrom units. The method used in measuring ultra violet rays was as follows: A spatula full of lithopone powder of the light-sensitive type is placed on a glass slide, and enough distilled water is added to make a moderately thick paste. A piece of transparent quartz is placed down on the lithopone and the quartz and glass plates are held together by elastic bands, thus insuring a thin layer of lithopone, which should be uniform and free from air bubbles. In this way evaporation and drying, which affect the sensitivity of the lithopone-water-paste, are prevented. The sample is then placed in a holder with the quartz side out and exposed normally to a beam of ultra violet light. The distance from the sample to the burner being known, the time of darkening is taken with a stop-watch and the experiment is considered complete when the reflection factor of the exposed lithopone is diminished to 50 per cent. This is indicated by a piece of standard gray paper with a 50 per cent reflection factor, shade 7/1 red, obtained from the Munsell Color Company, 10 East Franklin street, Baltimore, Md. Knowing the time required to give one lithopone unit of ultra violet light at a certain distance from a given source, it is possible to calculate roughly the time required to give a lithopone unit at any other distance from the same source by the inverse square law. Strictly speaking, this is not entirely accurate, but where the time of exposure is six minutes or less, for the production of one lithopone unit, the mathematical calculation is sufficiently correct for all practical purposes.

Dr. Clark performed some interesting experiments which I will show you graphically in the lantern slides and in her experiments the darkening of lithopone, the killing of bacteria, and the production of erythema corresponds very closely in time. She states that these three reactions are presumably photo-chemical reactions produced by the emission of photo-electrons under light and it is not surprising, therefore, that the equivalent distance curves are parallel. The accompanying chart shows the number of lithopone units necessary to produce an erythema dose, lethal action on bacillus coli, and to coagulate egg albumen. Therefore, with any source of ultra violet light, if the time of exposure is determined which will darken lithopone to a reflection factor of 50 per cent at a known distance, then this multiplied by 2.1 will produce a just perceptible erythema (remembering that the number of lithopone units needed to produce an erythema probably varies with different individuals.

We performed the above experiments hundreds of times and found them reasonably accurate and certainly simple enough to perform.

SUMMARY

1. The need for a definite, universal method of measuring ultra violet rays is unquestioned.

2. A review of the literature shows that the present methods advocated are of two varieties: (a) chemical; (b) by color variation.

3. The literature reviewed in detail.

4. Janet H. Clark's lithopone method is shown and advocated.

5. A formula is offered which will enable workers to calculate dosage.

CONCLUSION

An analysis of the various methods presented shows something of value in each one. The methods that appealed to me most were those presented by Pohle and by Dr. Janet H. Clark. It seems to me, however, that in any method where a number of chemicals must be mixed, the chances for error are somewhat greater than otherwise. In the Clark method of using lithopone as an indicator, the only difficulty to face is the acuteness of color sense of the experimentor, for once a unit is determined, then the expression of forms and methods of treatment in the terms of units can be transmitted regardless of type of lamp, distance, age of lamp, etc.

An algebraic formula may be used to express dosages. The following formula has been found to work satisfactorily in calculating light dosages, time, and distance in lithopone units.

Let D = distance desired.

And U. D. = the unit distance at which a lithopone unit is determined.

Then T = the desired time and U. T. = the unit time.

The following formula then holds:

$$\text{The dose} = \frac{D^2}{(UD)^2} \times \frac{T}{UT}$$

Suppose that we determine one lithopone unit as 20″ distance and one minute in time. We desire to give six lithopone units at 18″ distance. According to the formula, then, we have:

$$\frac{18^2}{20^2} \times \frac{6}{1}$$

which equals 4.9 minutes.

No. 2. Suppose one lithopone unit is 30″x 3 minutes. We desire six lithopone units at 20 inches distance. Then $\frac{20^2}{30^2} \times \frac{6}{3}$ equals the time, or $1\frac{1}{3}$ minutes.

No. 3. Suppose we are giving a treatment of 30″ and 14 minutes and want to express it in L .U. Our standard is 20″x1 minute equals 1 L. U. Then $\frac{30^2}{20^2} \times \frac{14}{1}$, which equals 31 L. U. This will be the answer.

It can readily be seen that, given two factors, the third is readily determined by the formula.

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DISCUSSION

DR. NORMAN E. TITUS (New York City): I am sure when Dr. Schiller came to the part that showed

this formula and how it worked it clarified a lot of the mathematics with which physicians are not very familiar.

Of course in physical therapy we are working for more exact methods, and the ultra violet light has been the one subject which has given us trouble to express in written and spoken language and transmit to people at a distance so that they could produce the same kind of results we have produced. I am quite sure until we get a method of measurement of ultra violet, nothing will come up to the method of getting the changing color of the lithopone.

For years people have tried to get up colormetric methods to estimate ultra violet. All sorts of fancy machines have been brought to our attention and practically all have depended upon our ability to differentiate between tones and shades of color.

Here we have just one comparison, quite exact to look upon. We can figure out a unit of measurement.

I might mention one thing I have noticed here, and that is the lack of unanimity in designating the lamp which gives us the green light. It is really a mercury arc lamp. Any electrical arc generates ultra violet, and all it takes is a tube of quartz to keep the mercury from spilling all over the floor. I think it much better to say carbon arc, tungsten arc, describing the arc rather than saying quartz mercury. It is a mercury arc. I think the more we use a simple name for it, the less confusion there will be.

I feel that every year that we meet we will find much more of interest in ultra violet. I am sure that this year through the survey Dr. Schiller has made of the literature, and the contribution he has made to our discussion, we will have a more comprehensive knowledge of the use and measurement of ultra violet.

Dr. Albert Bachem (Chicago): I think Dr. Schiller's paper showed the immense importance of ultra violet measurements. He reviewed the literature pretty thoroughly and described the various methods which are, I would say, in more or less common use, though very little measuring is done in ultra violet.

Dr. Schiller omitted two methods of measurement. One is the actinimeter which uses the selenium chamber and is convenient although not very accurate. It is useful for close comparisons of the same sort of light, and from one to another day, and so on. He also didn't mention, as far as I heard, the simple photographic methods.

I should like to mention that the most useful method for ultra violet seems to me to be the cadmium cell, because the cadmium cell gives very accurate and constant results, and especially compares closest to the sensitivity of the skin as far as various wave lengths are concerned. The point has been brought up by Dorno in Switzerland who made very elaborate measurements between the intensity of the light, the various wave lengths and the sensitivity of the skin.

From the paper we just heard, I think the audience, as well as I, got the impression that most of the units are not clearly determined. In particular should we separate the biological observations and physical measurements. I have come to that conclusion from my own measurements that I undertook with Professor Peterson of the University of Illinois College of Medicine. We measured more than 100 normal subjects and patients and determined the sensitivity of the skin toward a Kromayer lamp which was operated under exactly constant conditions. We determined the sensitivity of the skin toward ultra violet by two measurements, one by the time it took when the first discoloraion showed up, which time varied between half an hour and unlimited with no erythema occurrng at all. So there is an immense difference showing up between various subjects.

The same thing holds true for the intensity of the reaction which was estimated by a so called erythema meter which was given in the German literature a few years ago and which we copied. From these two figures we determine the sensitivity of the skin. This sensitivity varied at about a ratio of one to four between four groups. The variation of the extreme figures was still more pronounced.

Just to give you a few of our results, the ultra violet sensitivity is greater with a shorter blister time, or with a higher permeability of the skin. The ultra violet sensitivity is higher for a smaller muscle irritability by electrical tests. The ultra violet sensitivity runs parallel with the basal metabolism and with the skin conductivity. These observations indicate to me that the sensitivity of the skin in producing an erythema is extremely different, much more, for instance, than the skin sensitivity toward the x ray in producing x ray erythema. Therefore it seems to me that we should first determine an exact physical unit and, second, study the ratio between the physical and biological observations. Then we know that they are based upon such scientific methods, which will permit exact dosage, and at the same time give allowance for the wide range of biological sensitivity.

Dr. Arthur E. Schiller (closing): For want of something better and until these various degrees of sensitivity are determined, until some simple method is found that will take the place of it, I have determined to use this plan whereby I can express to my own satisfaction a dose of ultra violet ray.

CONSTIPATION*

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Constipation in itself is not a disease but merely a symptom of a great many diseased conditions, but is so often the only apparent or basic symptom of which the patient complains, that its discussion as a separate disease entity is deemed proper.

Constipation may be defined as "The abnormal retention of waste products in the human system." It must not be confused with obstipation, which is a condition in which there is a sufficient quantity of fecal material, and a normal functional activity; but in which some deformity, growth, flexion, constricture, or foreign body in the intestinal canal offers a mechanical obstruction to the passage of the fecal current. These two conditions are so frequently confounded in the mind of the average practitioner that the distinction must be always borne in mind; for the treatment of these conditions are entirely different.

There are two varieties of constipation:

1. Atonic constipation.
2. Spastic constipation.

While peristalsis is involuntary, in the vast majority of people the voluntary control over the sphincter is normally sufficient to withstand peristalsis. The strong expulsive efforts soon weaken when opposed and retarded by a tightly contracted sphincter, and shortly the constipation habit is produced.

Constipation is, and always will be, one of the most common afflictions of the human race. No patient who comes into the office of the average physician is turned away more quickly with a single prescription for some drug or combination of drugs than the constipated individual. Because of thoughtless, careless, or unscientific medication by practitioners, the majority of patients suffering from so-called constipation have been driven to self-medication by means of proprietary cathartic preparations, and have been driven to cathartics and enemata, and has exhausted the laxative properties of one advertised proprietary preparation after another, because of the fact that when he did consult his physician he was given a prescription for "A. S. and B. pills" or "a dose of salts" every morning, and that was all there was to his treatment.

It is a well-known fact that carnivorous animals are constipated, while the herbivorious animals have full and frequent bowel movements. Realizing this fact, it, therefore, behooves us to see that a sufficient quantity of ruffage or vegetable material, which will leave undigested fiber in sufficient quantities to produce stimulation of the bowel, such as corn, cabbage, celery, carrots, beet tops, lettuce, spinach, watercress, kale and other green vegetables, as well as seed vegetables and fruits, is incorporated in our daily regimen. The dietary should also contain a sufficient quantity of mineral salts, particularly sodium chlorid, because of the gas development which they cause, bearing in mind the fect that carbon dioxid gas is one of our best laxatives. Above all, the food must not be concentrated; it must give sufficient bulk to the stool so that it will properly fill and distend the bowel, give it work to do, and thereby produce the proper stimulation to contraction, which is distention. The value of oatmeal, whole wheat bread, and bran lies in the quantity of cellulose in the husk, which is a very important element in the stimulation of the mucous lining of the bowel. People who frequent the quick-lunch counter and cafeteria and who devour a full meal in ten minutes do not properly masticate their food, thereby causing incomplete stimulation to peristalsis, and consequently improper stools.

Hirschman states that the studies of intestinal peristalsis, by means of repeated fluoroscopic observations made of large and small intestines after the ingestion of opaque meals, have given us some new light on the normal movements of the intestines. We know that it takes the contents of the small bowel four hours to travel from the pylorus to the cecum, the dis-

*Read at sixth annual meeting, American College of Physical Therapy, Chicago, Nov. 2, 1927.

tance of twenty feet in the average case. From the ileocecal valve to the rectosigmoidal juncture the rate of progress is much slower, the average time being from fourteen to twenty hours. It will be noted, therefore that the waste products of ingested food should normally be expelled approximately twenty-four hours after the meal. Retention longer than that period would make the patient either a constipated or an obstinated patient, depending on the cause of this retention.

After the food has entered the stomach and the albuminoids are converted into peptones, it passes through the pylorus into the small intestine. As the stomach contents pass through the pyloric valve, they are acid. The secretions in the small bowel—the bile and the pancreatic juice—being alkaline when the acid contents are poured into the small intestine, coming in contact with the alkaline intestinal secretions, a stimulation, or irritation, is caused, which produces a wave of muscular contraction, or peristalsis.

At the same time that the chemical reaction of the stomach contents on those of the intestine is going on, certain gases are created. These gases serve to distend and increase the caliber of the bowel, and by this distention still further stimulate muscular contractions. These gases are not abnormal but serve a most useful purpose. It is when they are in too great quantities and produce too great distention of the intestinal canal that they are harmful. They then cause atony or paralysis of the circular muscle-fibers and loss of muscular tone. These gases are largely re-absorbed by the blood vessels or discharged from the anus.

Another very important source of stimulation to the coats of the bowel is the harsh, indigestible particles of food, familiarly called "ruffage," which are not acted upon by the digestive secretions. These also irritate the mucous lining of the bowel, and stimulate the contraction of the circular muscular fibers of the small intestine. Of no small importance is the stimulus caused by the to-and-fro movement imparted to the bowel by the movements of respiration. The upward and downward excursions of the diaphragm impart to the small bowel in particular, but also to the transverse colon, a movement which stirs up and churns, as it were, the intestinal contents. The respiratory movements change the position of the bowel, and help to keep the intestinal contents on the move. It can be easily seen, therefore, how any article of clothing, or posture assumed, or certain occupations which restrict the full expansion of the chest will interfere with the intestinal functions and assist in causing constipation.

The intestinal contents are fluid until they reach the ileocecal valve. The mucous membrane of the colon is thicker and not so sensitive as that of the small intestine and requires more stimulation; consequently the stools are more solid in this portion of the bowel. If, however, an excessive amount of vegetable fiber and indigestible material is present, the colon tends to become overstimulated, overdistended, and atonic; the fecal mass moves very slowly, and chronic constipation, and sometimes fecal impaction results. The fecal material, when it reaches the sigmoid, rests until ready to be passed out through the rectum and anus.

The re-absorption of these toxins causes an autotoxemia, which in itself is responsible for the symptoms improperly called "bilious." The large intestine is, in fact, one of the most important foci for all of the symptoms now known to be due to "focal infection." Among these symptoms may be enumerated rheumatism, neuritis, dizziness, vertigo, headache, loss of appetite, foul breath, mental sluggishness, a lack of ambition, nausea, and in some cases periodic attacks of vomiting, and a general feeling of fatigue and listlessness. The liver is more often upset by the absorption of toxic material from the large bowel through the portal circulation than are the so-called syndrome of biliousness and so-called torpid liver causes of constipation. Bile is not nearly so important a factor in normal peristalsis, and defecation as was formerly thought. Its presence does not stimulate peristalsis in the small intestine to any production of peristalsis or defecation. It is merely the excretion of the liver containing the waste products remaining after the liver's performance of its more important functions of detoxifying poisons that enter the body by way of the gastro-intestinal tract; to store up some of the excess of fat

taken as food, and to release it when the external supply becomes deficient; to store up glycogen and to convert it into glucose and liberate it as required by the system; to assist in the metabolism of the proteins to the extent at least of forming urea or ammonia compounds, and other minor functions.

The argument advanced by some, that the administration of a laxative, which by increasing the flow of bile and by "unloading the liver," empties the bowel, thereby relieving the symptoms of auto-intoxication, is conclusive proof that the liver is at fault in the matter, loses its force entirely when we recall that many cases of autotoxemia are relieved by the mechanical cleansing action of an enema or colon flush. This, of course, acts without the assistance of the so-called natural purgative bile. The erroneously named "liver pill" accomplishes the same result by its purgative actions, without regard to the fact of its having a chologogic actio. The fact that bile is not essential to normal defecation is illustrated very nicely in the normal intestinal peristalsis and defecation, taking place in patients suffering from a permanent biliary fistula, and who have no bile in the intestinal tract at all.

The prognosis as to cure depends on two factors; first, the length of time the condition has persisted, or what is commonly the same thing, the age of the patient; and, secondly, the degree of cooperation the patient is willing and able to give in carrying out a course of treatment. As regards the latter factor, it need hardly be pointed out that it is much easier to cure even an old patient who is concientious in "playing the game" than a young one who, through wilful negligence or some other reason, fails to put forth the earnest effort which alone can spell success in the treatment of this condition. In regard to the duration of the disorder, it is equally obvious that the sooner adequate treatment is started, the better the chance of cure, and particularly is it true that hygienic methods alone are more likely to be effective the earlier in the course of the disease they are instituted. In other words, it may be given as a rough rule that persons under 40 or 45 years of age may be cured without the use of cathartics, whereas those over that limit may need the temporary assistance of these drugs, or may never be cured in the sense of being able to do entirely without them.

Before taking up treatment, let me call your attention to physical exercise. In normal subjects the exercise incident to making the morning toilet is frequently sufficient to provoke a desire for stool by breakfast time or soon thereafter. In the constipated individual, on the other hand, much more specialized effort in the way of exercise is obviously necessary. The object of such exercise is to strengthen the voluntary muscles of defecation and to cause rapid changes in inta-abdominal pressure. To this end all movements involving the obdominal and thigh muscles are particularly advantageous. Hurst recommends especially the following exercises: hill climbing, rowing, skipping, swimming, horseback riding, gardening, bowling. He also advocates Swedish movements, as follows:

Lying:

1. Sit up and bring fingers to feet.
2. Raise thighs with legs extended.
3. Draw in and push out abdomen.

Standing:

1. Bend forward with knees stiff and touch feet.
2. Bend to side, touch feet with hand.
3. Hands on hips, twist body around.
4. Lean back and move body about pelvis in a circle.
5. Goose step standing.
6. Hands on hips. up on toes, squat.

In all forms of exercise the following points are of importance: (1) Fatigue from over-exercise is much more harmful than no exercise at all; (2) Exercise must appeal to the patient as pleasant and exhilarating to do any good; (3) a little work done regularly is better than much done sporadically.

It has been well said that physicians no longer study to discover the type of disease the patient has, but rather they try to find out what kind of a patient the disease has. In every case dietetic errors and excesses should be ascertained and corrected and the patient instructed as to the types of food best suited for his condition,

the quantity to be taken and the proper time to take them. If he is not able to properly masticate his food, he should be referred to the dentist and his teeth put in perfect shape. He should be instructed to drink from six to eight glasses of water in every twenty-four hours—a full glass of cold or hot water on arising, and also on retiring. He should drink plenty of water between meals, but very sparingly while eating. It is essential that he eat a sufficient amount of vegetable foods. He should take plenty of outdoor exercise, such as tennis, golf, horseback riding, swinmming, and best of all, long walks in the open air. Breathing exercises should be indulged in, and in some cases massage of the abdominal muscles will be necessary to restore their tone. The "setting up" exercises of the army can be recommended to the constipated patient, and, if persisted in, will be a great help in his treatment.

Any local condition such as hemorrhoids (which of themselves do not cause constipation but are an effect of constipation) should be remedied by surgical means or treated locally. Proctitis should be relieved by the proper dietary, and medications applied locally.

Patients who are run down may require general massage, which should be given by a properly qualified masseur. If the sphincter is abnormally tight, it should be relaxed under local or sacral anesthesia. Most important of all, however, the atonic rectum and sigmoid should receive internal massage.

A great many drugless methods of treating constipation have been offered to the medical profession. All kinds of electric treatments, external massage, cannon-balls, gymnastics, vibratory massage, baths and what not, have been tried, and while satisfactory results have been obtained from each of them in certain cases, there still seemed something to be desired in the successful treatment of chronic constipation without the use of cathartic drugs.

The patient must coooperate in every way. His mental attitude must be attuned to his treatment. When he attempts his daily evacuations, he must keep his mind off his work. Suggestion plays a large part in the reestablishment of a normal function, and functional constipation is peculiarly susceptible to constructive suggestion. The small boy who was promised a ticket to the "movie" every Saturday if he had a daily movement for the preceding week proved the efficacy of suggestion in this condition!

An internal medication which has been found useful has been the administration of extract of nux vomica in one-fourth to one-half grain doses before meals has been found of value in patients who show symptoms of intestinal indigestion. In those cases where starchy food is found difficult of digestion the administration of takadiastase in doses of four to ten grains has been found of service. The author has experienced great satisfaction from the administration of petroleum oil. The dose of oil is gradually decreased until at the end of the treatment it is entirely withdrawn.

TREATMENT OF CONSTIPATION

Special forms of constipation.

Heretofore we have dwelt on the various principles underlying constipation in general. It is convenient at this point, in order to aid further discussion, to distinguish two forms of constipation which are clinically prominent. These are:

1. Atonic constipation.
2. Spastic constipation.

The treatment most appropriate to each of these forms may now be considered.

Atonic Constipation.

Atonic constipation is etiologically associated with one or more of the following factors:

1. Congenital intestinal atony.
2. The abuse of cathartics and enemata.
3. A distal spastic constipation ,in which the atony is limited to the colon proximal to the point of spasm.

Whether the primary defect be assumed to lie in a congenital muscular hypoplasia or in a defective neuromuscular mechanism of the colon, the direct object of treatment is to increase the inherent capacity for normal and effective propulsion of the fecal column. The policy of stimulation, as carried out in every day practice, should include practically all of the methods of treatment heretofore described, par-

ticular emphasis being laid upon increased water consumption, bulky diet, the institution of regular bowel habits, and the discontinuance of all artificial aids to evacuation. Where the subject is unusually malnourished or asthenic the stimulation, appropriately modified, should be combined with a fattening cure and with the correction of ptosis by abdominal support.

An outline of treatment that thas worked well in practice is as follows:

Management of Constipation (Atonic)

(Vanderbilt Clinic Diet lists)

General Rules:

1. Have a regular time for meals.
2. Have a regular time for going to the toilet.
3. Take no cathartics or enemas unless ordered.
4. Take a daily walk in the open air.
5. Practice the exercises prescribed.

Exercises: (Each to be done fifteen times).

1. Knees stiff, bend forward and touch the floor.
2. Bend back from hips.
3. Bend to the right and left from hips.
4. Twist to the right and left on hips.

Diet: Breakfast—

Any fruit (fresh, cooked, preserved or dried).

Dry or cooked cereal with cream or butter.

Bread (graham, rye, bran, whole wheat or corn).

Marmalade, jelly or jam.

Coffee with cream and sugar.

Lunch and Dinner—

Soup (without milk or flour).

Fish, meat, eggs (eat as much fat as possible).

Vegetables, fresh or canned. Greens, especially those with residues (celery, lettuce, spinach, cabbage, etc., up to two cupfuls a day).

Salads with oil.

Desserts—fresh or preserved fruits are best. Jellies, pies (except under-crust), water ices, ice cream in small amounts. Bread (see breakfast) and butter.

Fluids—

At least one glass of water on arising and otherwise freely up to eight glasses daily. Carbonated waters, buttermilk, fermented milk, cider.

Avoid or use in moderation—

White bread, noodles, macaroni, cake, rice, barley, potatoes, cheese, tea, milk (only in some cases).

Spastic Constipation.

Spastic constipation is more common than is perhaps generally recognized. It is characterized by the existence of a state of increased tonicity of the large intestine. The distal portion of the gut is the part usually involved, the condition affecting either the entire colon from the hepatic flexure onward, or certain special areas such as the descending colon, the pelvic (sigmoid) colon, the pelvi-rectal flexure, or the anal sphincter alone. In the last named instance local lesions play an exciting role (fissures, ulcers, hemorrhoids).

The common symptoms of spastic constipation are abdominal cramps, general or localized in the left lower quadrant, often increased in intensity by defecation and still more by catharsis; peristaltic unrest; and the passage of small thin stools, or of separate hard lumps like marbles (sheep dung stools). Examination of the left lower abdomen often reveals an easily felt descending colon which may contain one or more scybalous masses, and which may relax and contract under the palpating fingers. This condition is not infrequently associated with a distended, gurgling, and sometimes tender cecum. The anus may feel tight to the examining finger, while inspection of the pelvic colon with the sigmoidoscope often reveals the presence of an irritable, spastic condition which may prevent the introduction of the whole length of the instrument.

In short, we are dealing with a condition of colonic irritability very similar to that of "gastric irritation." The principles of treatment are also very similar, involving rest, smooth diet and sedative medication. In order to obtain as much rest as possible in patients who must keep on working, it is well to break the nervous strain under which they commonly labor by periods of deliberate relaxation after meals, at the time when the bowels should move, and for as long a stretch at night as possible. A

warm daily bath may help considerable in this direction. Instead of a coarse stimulating diet, as that recommended for the atonic form of constipaion, the food should be particularly bland and non-irritating. For this purpose the standard bland diet is well adapted.

Sedative measures are both general and local in character. Of the general sedative drugs commonly employed, bromids before meals and bromids and chloral at night give good service. Codein, and in some cases of extreme irritability, morphin may be required before the restoration of normal bowel action is consummated. Belladonna (atrophin) is here of special value, particularly where its toxic effects do not spoil its action. Many cases of spastic constipation are cured by belladonna without the help of any other agent.

Chief among the local measures are the oils. These may be administered either by mouth or by rectum. By mouth both olive oil and mineral oil are of value. Mineral oil softens the feces by mixing with them in the form of small globules. The dose required varies considerable in different individuals, the average daily amount ranging from one to three ounces. It is better taken in one dose at bed time, as it will not disturb digestion where taken after stomach is empty.

For rectal administration both forms of oil have been recommended. The vegetable product is, perhaps, the more popular for this purpose. The results of this form of application are on the whole very gratifying and are due in part to actual lubrication and soothing of the irritated and inflamed mucosa, and in part to interference with water absorption and with the formation of dry, hard fecal masses. The simplest and best procedure is to administer small oil injections, to be retained over night in the colon. Depending on the patient's tolerance, from two to four or more ounces of oil, warmed to body temperature, are introduced in the recumbent position just before retiring. For the actual injection a small hand syringe may be employed, or a rectal tube with a funnel.

Oil injections should be made in full doses nightly during the first two weeks or so of treatment. When satisfactory spontaneous stools recur regularly each morning, the amount of oil should be reduced for the next week or two. If everything still goes well, one or two injections may be dropped during the following week, and every other injection during the week after that. Fnally, an injection should be taken only on those evenings when the bowels are not moved during the daytime.

In those cases where the spasm is limited to the anal sphincter a careful inspection should be made to rule out such local sources of irritation as hemorrhoids, fissures, parasites, etc., and where found these should be given appropriate treatment.

Electrical treatment.

In addition to diet and medication, I use certain electrical currents, as static and slow sinusoidal currents.

The static treatment is given thus: have the machine connected for Morton wave current, the patient on the insulated platform, in a reclining chair, insert a metal rectal electrode and give as slow a spark as you can get and yet have it as strong as patient can take comfortably—give this for fifteen minutes; often you will have to stop the treatment for the patient will have to hurry to the toliet. Give these treatments daily for a while, then every other day and so on until they are not needed.

The sinusoidal technique that I use is the one given by Dr. Morse. The author uses various hookups for treatment with slow sinusoidal.

First Method. One electrode in rectum, other over splenic flexure of colon.

Second method. One electrode over sixth or seventh dorsal nerve, other electrode over sigmoid.

Third Method. One electrode over sixth or seventh dorsal nerve, the other with a bi-fucated cord, one pad on right and other on left side low down on abdomen.

ELECTRICAL TREATMENT OF OBESITY*

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Galvani first demonstrated that muscle contractions can be produced by electricity. Since his time, physicians have collected a very large amount of experimental and clinical data concerning the physiology and pathology of muscle contractions. Especially, within the last year, the finer proceedings of the physiology and metabolism of the muscle at work, have been the object of extensive observation. Unfortunately these experiments were concerned with the continuous current only, that is, to an unphysiological form of irritation. For, as we know, the normal innervation current consists of a number of current impulses quickly following each other.

In the following we shall examine the actions of electrically produced muscle-excitations on the total metabolism and the relationship it bears to the functions of the body in general. As a result of this study, which I have been engaged in since 1910, I came to the conclusion that the general physiological effects of electrically produced muscle excitations are very much dependent upon the *form of the current* which is going to be applied and upon the special *manner* in which this current is to be applied, so as to produce as great an action as possible, and to avoid accessory actions. It was necessary, therefore, to review the entire muscle physiology and make a thorough study from this point of view. I have begun this work, but it will probably take several generations to complete it and to determine the numerous and difficult questions which offer themselves, and which actually touch the limits of physics and biology.

It is a very old experience, that heavy physical work or intensive exercise, in combination with a certain degree of underfeeding can avoid the deposition of fat or reduce already existing obesity. Since muscle work can be produced not only through the will, but also by electrical applications, it was thought likely that this fact could be applied in the treatment of obesity. Bergonie popularized the electrical treatment of obesity among physicians and laymen. It must be stated, however, that the principles of such treatment were demonstrated by Dr. Kellogg of the Battle Creek Sanitarium in 1904, at the International Electrical Congress at St. Louis. Kellogg used a sinusoidal current of very low alternations and obtained good results. But the dangers of the sinusoidal current have since become known. Bergonie was quite right, therefore, to seek another form of current. He believed he had found it in a special induction current which he produced from a certain kind of induction apparatus. This current, too, makes disagreeable and sensitive irritation, and it is dangerous to the heart. For these and other reasons which I shall discuss later the method is dangerous for many patients. For these reasons I began, as already mentioned, my experiments in seeking first for a suitable current source, which, having the utmost motor exciting action, ought to be practically indifferent to the sensitive nerves.

Only the continuous current, the sinusoidal, the faradic, Leduc's high frequency currents and condensator discharges existed when I began my experiments. Contiuous and faradic currents had to be rejected from the start on account of their preponderating sensitive irritations which were felt as soon as greater amounts of currents were used; the last especially, on account of its irregular form of curve, which differs in every apparatus. The sinusoidal current is equally unphysiological and produces myographic curves which resemble those of tired or degenerating muscles. High frequency currents in their pure form neither have sensitive nor motor effects. Condensation discharges are too short and also unphysiological. The Leduc current would answer if it were not a continuous current, which becomes too dangerous when stronger currents and longer applications are used. As a result of these unsatisfactory factors, I endeavored to

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find a new current which would possess the qualities ideal for the purpose at hand.

The current had to be of an alternating type—its curve had to rise and fall perpendicularly with the positive and negative phase symmetrical. The frequency and duration of the current flow had to be so tolerable that the best possible myographic curve resulted and with a minimum sensitive accessory action. Lastly, the current must be uniform; every apparatus to produce the same current curve. I therefore constructed (1912) a transformer (Fig. 1) which constructed (1912) a transformer which functioned on metall ic contacts and brushes of carbon or copper tissue. The duration of the flow of the current was optionally regulated, to adapt it to the optimum individual irritation. But because the apparatus was operating with the same electrical means as does the Leduc apparatus, the same technical difficulties were present. I shall demonstrate to you pictures from recently published investigations by Dr. Scheminsky: "The interrupters for the Production of Leduc's Meander Currents" (Klinical Wochenschrift No. 19, 1926).

I now show you here a new apparatus which produces the type of current for which I aimed to produce for the theoretical reasons already mentioned. Instead of the bad carbon or metallic contact there are mercury contacts in which iron needles dip in. There are some difficulties caused by the quick entrance of the needles going in and out which could be removed only by certain adaptions. The sprinkling of mercury and the undulations of the surface of the mercury are avoided by using very fine needles, their entering into the mercury absolutely perpendicularly and through swimmers of small iron rings, which float on the surface. The entering depth of the needles; that is, the duration of the current flow, is regulated by the lift level and by regulating the level of the mercury through a fine screw. Besides, the construction is such, that the needles close the current always at the moment of their highest perpendicular speed.

Now this split alternating current is not continuously sent through the patient, but it is rhythmically interrupted, so that muscle irritation is only produced for a certain time and then an interval comes on. For clinical purposes the number of 50 irritation periods per minute has shown itself useful; and with a duration of the irritation of a fifth of the period and four-fifths rest. This mechanical problem has been generally solved by a metronom interrupter; but that switching off and on was not quick and exact enough. I therefore chose in this new apparatus the needle and mercury interruption.

If now, instead of the metallic short circuit the human body is interposed, the circumstances change. For there occurs a deformation of the current delivered by the apparatus, on account of the polarization effect. The current points in the beginning are showing now a decrement after an exponential function, in a rather small degree. But here too, we see a nearly perpendicular raise (oscillogram 8) and fall (1200 turns 100 volts, electrodes between both hands without gross switching). There are two curves photographed, one above the other: from X to X and Y to Y is one period, respectively. (The difference in the length between the positive current flow on one side and the negative on the other is caused, like above, only by the mercury filling, which has not been changed purposely). The same can be seen out of oscillogram No. 9, which equally proves the deformation through the body.

You see by the oscillograms that the apparatus delivers the current theoretically sought for. Before we now enter into the discussion of the clinical applications, I should like to propose that the special method of electrotherapy inaugurated by Kellogg, recognised by Bergonie, modified by me and which only now is rationalized through the new current of 1913, and that the one shown to you here, ought to be called by an indifferent name, such as electro-rhythmic. That designation shall embrace a current of alternating character and a form of curve like in the oscillogram, of governable duration of current flow and number of periods and the application of an exactly functioning gross switch (equally governable).

We are in fact now for the first time in possession of an alternating current, which is governable in all its characteristics, tension, in-

tensity, number of periods, duration of current flow.

The clinical application of this current touches different territories: first, we can apply it *without* interruptions; then it is suited for producing electrical sleep, electrical narcosis, and electrical local anethesia. Secondly, with rhythmic interruption, it serves (a) for diagnostic purposes applied to single muscles or parts or groups of muscles, or nerve points; (b) equally it has to be used in paralysis and muscle debility—for instance, after operations, after confinement, infantile paralysis, fractures, etc.; (c) applied to the whole body or the greater part of it, it is used for exercise, and for treatment of heart diseases, (terrain cure in lying situation) convalescence, for quicker reconstruction, etc.; (d) for treatment of disturbed metabolism, especially of obesity.

As interesting as it may be to speak about all these or similar applications, I shall limit this paper to the treatment of obesity.

It is impossible to represent in the form of speech this very great and difficult question completely. I will therefore only make some general remarks and then give the clinical results.

There is a difference between obesity and lipomatosis, though there are transitional cases and combinations of both. Obesity if further divided into the stuffing obesity and the constitutional inherited or acquired form. Here one also sees transitions. Besides race pecularities, obesity is always a symptom of disturbed metabolism. It is unscientific to presume that any method would cure every case of obesity. Often patients are sent to watering places—they are thoroughly purged there—have to run a good deal about—get little to eat and drink. Result: patients lose more or less kilos of water through the intestines and the sweat, and one or two months after the cure the old condition returns. Therefore, the habitues of Marienbad for instance. They must return each year. Why are there puggs and greyhounds? The pugg may be starved and still remains fat; the greyhound can eat as much as he will, but remains thin. The target of the physician must be to change his patient from a pugg to a greyhound. The living being is the most economical power engine. It always tries to reach the greatest advantage with the smallest amount of energy. If you give a man plenty of fat and carbohydrates the organism will try to cover its want of energy out of these sources, and only when they are exhausted, it has to attack its own fat and glycogen deposits, melt and burn them. So the problem of therapy is first to reduce nutrition; secondly, to force the body to attack its deposits. Thirdly, restrain the body from making new deposits.

Rational treatments for obesity, therefore, must consist first, in a diet which restrains fat; carbohydrates and liquid to a certain degree. Secondly, it must change the metabolism, i. e., essentially the internal secretions, or their vegatative steering. This is done by muscular work well dosed and slowly increased, (electrorhythmic), laxatives; treatment of certain organs (for instance—diathermy of the liver, x ray therapy of the thyreoidea, irritating irradiation of the ovaries, diathermy of the ovaries and the testicles, diathermy of the pancreas; physical therapy, strengthening of the will power). Improvement of the circulation by diathermy and the electrorhythmic current. Third, to preserve the therapeutically reached stage by regulating the mode of living: moderate diet, regular movement and fresh air, sport, to be moderate in drinking, especially alcohol.

As obese people don't like to do physical work and often are really not able to do so, the electrorhythmic represents next to diet the most important factor of the therapy. For the laziest patient even with an advanced fatty degenerated heart muscle, not only stands without any damage if the electrorhythmic is rightly dosed and applied, but he observes the improvement of his activity from the very first sitting. I have had patients who became breathless when they had to go from their desk to the door, and who after three sittings walked an hour or more without any physical fatigue—very soon went upstairs and had good results of long duration.

The general technique affords an equal loading of the whole musculature of the body. Patients with weak leg muscles must be arranged differently than those with strong ones, but with weak trunk muscles. Some patients badly tolerate the working of the superior back muscles.

Others, suffering from gall stones or chronic appendicitis, must be spared in relation to their stomach muscles. It must be thoroughly individualized for every case, because only then, the cure can be stood without damage and tiring. In heart disease the sittings must be short and weak, but by applying the right technique even patients with grave heart disease bear the cure well. Of course one must combine cardiac medication and diathermy.

In relatively sound obese patients under approximately 100 kilo, generally one cure of 25 sittings, daily, of one hour's duration is sufficient; then a pause of fourteen days and an after cure of about 12 sittings, then followed by six more weeks' diet, making altogether three months dieting. In light cases easier and shorter cures are sufficient, especially for local treatments, as in ladies often complaining of double chin or fat deposits in the neck or over the stomach. In these cases local electrorhythmic without diet is sufficient.

When the cure is rightly gone through and well directed, neither subjective nor objective disturbances of the patients are seen. Especially in the obese, the heart muscle is often weak—fatty degeneration and the peripheral circulation is poor. In such cases one begins with local applications and raises slowly and cautiously; combining suitably with diathermy or even with medicines. Especially in those cases the Borgonie apparatus is to be rejected, as Borgonie loads 80 to 100 kilos in sandbags on the stomach of the patient. This produces a continuous compression of the abdomen, the intestines and the diaphragm are pressed above, and it causes suffocation and weakness of the heart by obstruction of the diaphragmatic respiration and discoloration of the heart. For this reason I apply only very light sandbags from one to two kilos to fix the electrodes or use without sandbags rather heavy, adaptable electrodes, such as I demonstrate here, which keep in their place through their own weight. Herewith is provided that during the rhythmitic contraction of the muscle work is done as desired while in the contraction pause the muscle is able to recreate completely and to relax, without being kept in a permanent and tiring tonicity by the pressure of the sandbags.

One has tried referring to examinations of the gas metabolism, to doubt theoretically concerning the efficacy of the electrical obesity cure, and in fact gas metabolism experiments, which I have made myself fifteen years ago with Professor Zuntz, gave negative results or little increase of the oxygen consumption and that during the electrical treatment. The same has been stated by other investigators. Nevertheless the clinical results exist in fact. It is difficult to explain this difference. Two points seem to be important in that regard. First, *during* the treatment the basal metabolism is not noticeably increased, as it would correspond at least approximately to the loss of weight; nevertheless great reducements of weight come on, which are not explainable by nutrition deficit. Secondly, in some patients loss of weight is noticed *during* the cure, but sometimes none; and *afterwards* in weeks and months one observes *without* further dieting a gradual and lasting loss of weight.

I observed a gentleman of medium obesity of 85.7 kilo weight, who, in spite of diet and intense electro-rhythmic cure, only lost 2.2 kilo in 15 sittings. Then he interrupted the cure for a long time; in that time he gradually and constantly lost in weight and was weighing four months later seven kilo less than after the fifteenth sitting. In spite of 15 more sittings he only lost 200 grams and remained so and thus reached his normal body weight, reduced to the low standard of 76.3 kilo in a good proportion body-height from 1.79 meter at a normal food diet (case 265). A lady, weighing 68.4 kilo (case 288) lost in 31 sittings, which she had in the course of one month and a half 6.2 kilo. Without diet she lost in 33 sittings in nine weeks 4.8 kilo from an initial weight of 64.5 kilo. Without diet she lost in the next four weeks 44.5 kilo more. An older, very fat lady, hardly able to move, short, went in fourteen sittings from 126.5 to 122.5 kilo, i.e., loss of 4 kilo. She got then three further sittings and interrupted the cure. After 11 weeks she had lost 5.5 kilo more and remained constant. A small, stout man (case 108) from the year 1915, weight 104 kilo, he lost in 25 sittings only 1.8 kilo. Then, in the pause the change of his constitution began: within four days after the last sitting he lost more than during the whole cure; namely,

2.7 kilo; and two months after the last sitting he had lost altogether 25.3 kilo (i.e., 25 % of his weight). Now he remained stationery and had reached his normal weight. An elderly lady (case 155; 1913) weight 117.8 kilo; she lost in five sittings only 1.1 kilo; but these few sittings had ben sufficient to reverse her metabolism: she lost in two months 18.9 kilo more and remained constant with 97.8 kilo. And so many other similar cases.

In other cases during the cure a certain loss of weight was reached and this remained constant: for example, Mrs. L. (case 285) lost in 36 sittings from 74.2 to 68 kilo. This normal weight remained nearly constant (after three months 68.4 kilo) and after two years 70.1 kilo,)always without diet. A gentleman of medium size weighed in September, 1921, 79.3 kilo. He began to lose gradually a little more and only after one year and a puarter he began to increase very little. Therefore he began a new cure of ten sittings and reduced his weight from 71.3 to 70; this seems to be his normal weight. Many other examples could be alluded to, for showing the stationery state after the cure. Now one example, for the efficacy of electro-rhythmic in one of the gravest cases of constitutional obesity, in spite of the inefficiency of the dietetic underbalance. He became, when he was 19 to 20 years of age, very stout through excessive use of alcohol; he lost during his military service in his twenty-first year 25 kilo, down to 98 kilo. In September, 1912, he entered the clinic with 166 kilo, was dismissed with 145 kilo. He has been received into the clinic on the second of March, 1914, with a weight of 197 kilo. His general condition was very much disturbed; he complained of excessive salivation, great fatigue; he fell asleep very easily, even while standing. He was now set on caloric underbalance and had milk diet. He got daily only 1200 to 1300 calories and lost 17.5 kilo, by the twenty-sixth of March. Now his weight remained constant; it was impossible to reach a further loss by underfeeding. He remained constant until the thirty-first of march, until the electro-rhythmic cure began at the weight of 179 kilo. With the same diet immediately a constant loss of weight began; the fifteenth of May, that is after thirty-six sittings the cure was interrupted. Patient had lost, since the beginning of the electrical cure, in spite of its former balance and with the same nourishment, an additional 17.3 kilo and weighed at the end of the electrical cure 162.2 kilo. Here too, an after effect continued. He lost under the equivalent diet, corresponding to the smaller weight from 35 kilo less, i.e., 1100 calories, for a further 7 weeks—again 17.1 kilo. So as action of the electrical cure altogether, during the cure and the following seven weeks, he lost 34.4 kilo. His general state was so much improved that a year later, I am told he was engaged; after that he seems to have died; probably that was too much for his constitution; I am sorry I didn't hear anything more about him.

Let us now look at the four facts, proved by the above. First; no physiological, experimental proof for a simple direct burning of fat through muscle straining. Secondly, in spite of that there are clinical results to be shown from a statistical data of three hundred cases. Thirdly, further frequent loss of weight after finishing the cure, for months and years. Fourthly, efficacy of the cure even if caloric underfeeding cannot melt more fat. I may still add, that through experiments, which I lately began, there sems to emerge the fact that even during the cure alterations of the intermediant metabolism occur; but these experiments are not completed. Out of all that it seems to show, that the doubtless present efficacy of the electrical cure is not a direct and immediate consequence of the electrical muscle work, but that we are dealing with an indirect and probably very complicated mechanism of actions. I cannot enter here into detailed discussion on account of the shortness of time. At first the cure acts intensively on the circulation, directly on the peripheral through making easier the reflux of venous blood, indirectly on the general circulation through reflexes originating from the skin and the muscles. One regularly observes during the sitting a slowing down of the pulse with better filling of the arterial tube, and diminishing of the number of respirations in spite of intense muscle work. Even these two criterions are the chief practical measures for directing the cure. If pulse and respiration become quicker, then the sitting was too long, or the current too

strong, or the physical suit of excitations to quick, or the balance of distributing the current wrong. I am sorry of not being able to go in today on all the technical finesses. Secondly, a nervous component plays a role: the electro-rhythmic is strongly refreshing (of course, always with the right technic; fatigue must absolutely be avoided). The feeling of painlessly performed muscular work, the activation of muscles, which the patients have not been able to use at all, or only with greatest trouble, gives to the patients the feeling of being able to do things. Nearly every patient declares at the beginning of the cure, often after the first sitting, that he was able to work as never before, and I have had this experience some 14 years ago myself. I weighed before the cure constantly 91 kilo—used electrorhythmic treatment for fourteen days with diet, went down to 72 kilo and remained a long time; and only now after twelve years and without any exercise, I was beginning to increase to 75 or 76 kilo; certainly you will acknowledge the long standing action, with a careless diet; it is true, I very seldom take alcohol. This refreshing action of the electro-rhythmic cannot be canything else but a general feeling provoked through chonge of metabolism and this leads us to the third and chief point; the alteration of the endocrine system. A tendency for constipation occurs; the bulimie and polidipsy disappear very soon, the patients after the first week have no more difficulty to keep on that diet, the appetite for sweets and the thirst disappear: sometimes meat becomes repulsive, even in people who preferred it before. One can think of an activation of the digestive glands, but the relations are too complicated, for constructing a special theory. If we consider the constitution, in regard to the tendency for obesity, in the main as a function of the interval secretion, so we can conclude, out of the clinical results, of the after effects and of the general effects, that changes in the endocrine balance occur, which to speak of popularly, would make out of a pugg, a greyhound.

Not every patient is fit for the cure; some patients have very solid fat, which can be melted only with difficulty or not at all; some lose fat up to a certain degree, the rest remains unattackable. If there is, for instance, myxedema or ovarian insufficiency, we must combine it with another etiological therapy. In some cases, which are difficult to influence, one treats much more intensively and extensively. The number of twenty-five sittings for simple cases has been chosen partly on account of the round sum. While good results can be obtained in a few sittings, I treat severe cases twice a day, totaling fifty sittings or more. We can easily see in the table, that by increasing the number of sittings the percentage of loss of body weight equally increases and that the average ranges from 2 to 12.6 per cent. There is in fact no question, that in some severe cases good results can be attained by prolonging and repeating the cure.

I now give you a short table of statistics of three hundred cases. It comprises 150 cases from the years 1912-14 and 150 cases from 1924-26. This series comprises unselected favorable and unfavorable cases. No patient received more than dietary and electro-rhythmic treatment. No thyroedea, or similar preparations were employed.

Only heart diathermia was occasianally applied.

The three hundred patients consisted of one third men and two-thirds, women. The total weight at the beginning of the cure of all patients was about 26¼ ton. The total loss during and after the cure was 1½ ton.

The average loss of body weight amounted to 5.5 per cent. In some especially severe cases of obesity loss up to 25% of the body weight has been attained.

The three hundred patients received a total of 5,126 sittings—of 3,301 hours' duration. So in the average only about 17 sittings of 11 hours' duration fell upon each patient. This is a very important point; for the following table shows that patients, who had only 15 to 19 sittings, lost 5.3% of their weight—that is, as the general average; while those patients, who got 35 sittings and more lost an average of 12.6%. It follows, that many patients had too few sittings, and with a longer cure obviously there would be a loss more than double. But with many, there were only small cosmetic ef-

efcts expected and others broke off the cure too early.

The table shows clearly, that the absolute and per cent diminution of the body weight in this electro-rhythmic cure is a pure function of the intensity of the cure.

In consideration of the circumstance that many of the three hundred patients had not been treated long enough, namely, about one-half of them, had only less than 15 sittings, the loss of weight in the average of all cases of 283 grams a sitting, relatively 338 grams per hour of treatment, is a rather considerable one. If we only take the patients, who had 35 or more sittings, we have an average loss of 300 grams per sitting.

Corresponding to the reduction of the weight generally a reduction of the mass of the body occurs and sometimes one sees with a small decrease of weight a distinct decrease of circumference. This is to be explained by the fact that throug hthe electro-rhythmic the muscles increase, and so balance partly again the weight, because they are of higher specific weight than fat and in consequence the circumference decreases quicker than the weight. Some examples:

Mrs. M. Circumference of abdomen: 124 cm.

After 11 sittings ..... 116 cm.
After 19 sittings ..... 106 cm.
After 25 sittings ..... 98 cm.
Four weeks' pause ..... 94 cm.
Further 8 sittings ..... 92 cm.
After 15 sittings (normal) ..... 88 cm.

Mrs. S. Abdomen, 160 cm.

After 13 sittings ..... 145 cm.
After 32 sittings ..... 127 cm.

Mrs. O. Abdomen, 119.5 cm.

After 10 sittings ..... 99 cm.

Mrs. W. Abdomen, 114 cm.

After 5 sittings ..... 104 cm.
After 12 sittings ..... 99 cm.

Mr. D. Abdomen, 108 cm.

After 9 sittings ..... 99 cm.

Mr. B. Abdomen, 117 cm.

After 32 sittings ..... 99 cm.

Mrs. H. Chest, 104 cm.

After 25 sittings ..... 92 cm.

Mrs. K. Chest, 107 cm.

After 29 sittings ..... 99 cm.

Mrs. K. Chest, 113 cm.

After 7 sittings ..... 103 cm.

Mrs. W. Chest, 98 cm.

After 13 sittings ..... 89 cm.

Miss G. Thigh, 87.5 cm.

After 6 sittings ..... 62 cm.

Mr. R. Neck, 43.5 cm.

After 30 sittings ..... 39 cm.

Waist, 193 cm.

After 30 sittings ..... 90.5 cm.

Mrs. A. Arms, 30 cm.

After 20 sittings ..... 26 cm.

Thigh, 76 cm.

After 24 sittings ..... 69.5 cm.

To resume: Nearly one and one-half tons loss of weight in 300 patients during and after the cure has in fact been observed. An average loss of weight of 283 grams per sitting, relatively 3382 grams per hour of electro rhythmic, is also a fact. In very fat individuals a loss up to 25 per cent of the body weight has been obtained. This also is a fact. Physiologically we are not yet in the state to understand these complicated mechanisms. At all events it seems not to be the direct burning through muscle work, but there may be indirect processes, which in a roundabout way over the circulation and the

TABLE

Number of Sittings	*Number of Cases*	*Total Loss*	*Per Patient Average Loss*	*Total Wt. Initial*	*in Per Cent Loss of Wt.*
35 and more	23	277	12.1	2203	12.6
25-34	66	476	2.0	8193	2.2
20-24	33	208	7.2	5643	8.4
15-19	35	156	6.2	2908	8.4
10-14	53	172	4.5	8946	5.3
Under 10	90	183	3.2	4392	3.9

vegetative nervous system produced an alteration of the internal secretion and influenced the constitutional disposition. This effect can be of long duration.

The electrorhythmic, as a treatment for obesity is to be regarded as an absolutely rational cure with good prognosis for results of long duration.

C. THURSTON HOLLAND, F.R.C.S.

The recent election of Mr. Holland to Fellowship in the Royal College of Surgeons of England crowns with fitting honor an international figure in the field of radiology. Twice president of the Roentgen Society, president of the First International Congress of Radiology, vice-president on two occasions and for many years honorary treasurer of the Royal Infirmary, Liverpool. Ch. M. University of Liverpool. His acts of friendship and the high standards set by him have done much to place England in the high place she holds in International Radiology.

EDITORIAL

ARCHIVES OF PHYSICAL THERAPY, X-RAY, RADIUM

DISRAELI KOBAK, M. D., Editor
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ALBERT F. TYLER, M. D., Managing Editor

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Seventh Annual Meeting
October 8-13, 1928
Stevens Hotel,
Chicago

THE SPRING SCIENTIFIC SESSION HELD AT THE HOTEL RADISSON, MINNEAPOLIS, JUNE 11, 1928

The spring scientific session was notable for many reasons. First, it gave physicians who attended the A.M.A. meetings an opportunity to listen in on a full day's physical therapy program. Secondly, it demonstrated the efforts of the college to standardize and rationalize the teaching of physical therapy. Thirdly, it attempted to make clear the necessity of representative scientific experimental and clinical work in several of the specialties. The papers on the teaching of physical therapy and physical therapy in the specialties were in the form of symposiums. These papers in the course of time will be published in the Archives.

Guest speakers included Dr. Roy A. Barlow of Madison and Prof. Victor E. Levine of Omaha. Both addressed the gathering after the College dinner on research problems involving considerable investigational work in the laboratory and in the clinic.

It is quite evident that meetings such as this are essentially necessary to further scientific physical therapy. Furthermore it enables certain physicians who are not able to attend our annual conventions to acquaint themselves with the policies of the college. These one day sessions in no way conflict with attendance at the regular A.M.A. sessions nor do they detract interest from them. On the contrary many physicians attend because of the feasibility of being present at both meetings. It seems to be the concensus of opinion that these spring gatherings be made an annual affair and that fellows of the college exercise every possible means to attend them in larger numbers in the future. Certainly the Minneapolis session was a success and the favorable comment which resulted is indicative of the will of the majority.

CLINICAL CONGRESS OF PHYSICAL THERAPY
AND
SEVENTH ANNUAL MEETING AMERICAN COLLEGE OF PHYSICAL THERAPY
Stevens Hotel, Chicago
OCTOBER 8th TO 13th, 1928

Some interesting developments pertaining to the annual fall session of the College may be

imparted at this time. First and foremost is the fact—and a great surprise to the medical profession of this country—that Dr. Carl Sonne of the Finsen Medical Light Institute, Copenhagen, will be our guest of honor. Dr. Sonne will give several important lectures, the titles of which will be announced in the preliminary program to be off the press about July 15. The second important development is that in addition to Dr. Sonne, several other foreign leaders in physical therapy will be with us and will offer valuable contributions in the experimental and clinical application of physical agents.

The program this year is unique in character. Never before at a meeting of this kind has such an array of talent been gathered together. Every possible source of information for teaching purposes and for instruction facilities has been exhausted. The result will undoubtedly be the greatest physical therapy meeting in history and one that will set a mark difficult to surpass in the future.

The additional feature of scientific exhibits should prove of unusual and extraordinary interest. No truly scientific medical meeting is complete without a display of scientific exhibits. And while an effort was made in the past to effect such a display, this year will see it in actual existence. This attraction in itself should provoke an overwhelming desire on the part of physicians, teachers and scientists to acquaint themselves with the numerous new phases of physical therapy presented in a strictly ethical and scientific manner.

As has been the custom heretofore, instruction classes will be offered, but instead of conducting these classes during the first three days, they will be given mornings during the first five days of the session. The afternoons will be devoted to sectional meetings, group clinics, demonstrations, clinical lectures, and the reading of scientific papers. The last day of the session, as has been the custom heretofore, will be given over to hospital clinics. These will be augmented in number, so that it will be possible to accommodate more visitors than during the past few years.

A partial list of lecturers who have accepted invitations to address the Congress follows:

Dr. Carl Sonne, Finsen Medical Light Institute, Copenhagen, Denmark.
Dr. C. S. Alloway, Champaign, Ill.
Dr. W. L. Cahall, Astoria, Long Island, N. Y.
Dr. F. W. Carruthers, Little Rock, Ark.
Dr. Gregg A. Dillinger, Pittsburgh, Pa.
Dr. D. Kobak, Chicago, Ill.
Dr. F. H. Ewerhardt, St. Louis, Mo.
Dr. Louis Feldman, Boston, Mass.
Dr. M. H. Cottle, Chicago, Ill.
Dr. H. M. Johnson, Buffalo, N. Y.
Dr. H. D. Holman, Mason City, Ia.
Dr. J. A. Key, St. Louis, Mo.
Dr. Laura A. Lane, Baltimore, Md.
Dr. Frank M. Mikels, Long Beach, Cal.
Dr. R. W. Fouts, Omaha, Neb.
Dr. A. R. Hollender, Chicago.
Dr. V. C. Pederson, New York City.
Dr. Norman E. Titus, New York City.
Dr. Frank H. Walke, Shreveport, La.
Dr. J. Thompson Stevens, Montclair, N. J.
Prof. V. E. Levine, Omaha, Neb.
Dr. G. Kolischer, Chicago.
Dr. S. T. Snedecor, Hackensack, N. J.
Dr. L. J. Levinson, Bronx, N. Y.
Prof. Carl R. Moore, Chicago.
Dr. L. K. McCafferty, New York City.
Dr. Garrett Nelson, Richmond, Va.
Dr. Ralph Pemberton, Philadelphia, Pa.
Dr. J. W. Torbett, Marlin, Tex.
Dr. S. H. Watson, Tucson, Ariz.
Dr. J. S. Coulter, Chicago.
Dr. F. T. Woodbury, New York City.
Dr. Louis Gries, Chicago.
Dr. Maurice Weisblum, Philadelphia, Pa.
Dr. E. N. Kime, Indianapolis, Ind.
Dr. H. A. Barrett, Chicago.
Dr. E. W. Hirsch, Chicago.
Drs. Withers and Ranson, Denver, Colo.
Dr. J .H. Hester, Louisville, Ky.
Dr. Curran Pope, Louisville, Ky.
Dr. J. Peter Herman, West Palm Beach, Florida.
Dr. Ralph B. Bettman, Chicago.
Dr. A. F. Tyler, Omaha, Nebr.
Dr. A. D. Willmoth, Louisville, Ky.

In view of these intensive preparations and a determined effort to afford each Fellow or guest an extraordinary means of acquiring cur-

rent information in scientific physical therapy, it behooves every physician to make the necessary arrangements to be present at this Congress. The hotel accommodations are excellent and rooms may be reserved at popular prices from $3.50 upward by writing directly to the Hotel Stevens, Chicago. In addition to the many attractive features of the meeting itself, Chicago offers every possible attraction for out-of-town visitors. Be sure to tab the date correctly—October 8 to 13, 1928.

ELECTROCOAGULATION vs. SURGICAL ENUCLEATION OF THE FAUCIAL TONSILS

Since surgical diathermy has come into usage for its destructive effects on tissue, numerous practitioners have heralded the method as a substitute for surgical tonsillectomy. Modifications of electrocoagulation have been suggested, some claiming the newer techniques superior to the older ones. Thus, Clarke of Philadelphia advocates electrodesiccation and claims excellent results with it in tonsil work. The precise nature of the desiccation procedure has been described frequently by Clarke. It is in principle a process of surface tissue dehydration, in contrast to electrocoagulation, which involves a high frequency current of sufficient intensity to raise the temperature of tissues beyond physiological limits and thereby destroying them. Electrocoagulation is a biterminal method; electrodesiccation, a mono-terminal method.

Whichever of these procedures is employed, one argument has as yet not been overcome by the adherents of tonsil-coagulation practice, and that is an accurate way of determining the dosage to be applied. Improved technic now calls for a minimum amount of destruction of tonsil tissue at a single sitting, requiring as many as six or more treatments to complete the operation. In this way it is claimed that no gross destruction of tissues with severe effects on the patient is entailed and no injury is produced on neighboring organs.

There are many advocates of tonsil-coagulation. On the other hand there are numerous surgeons and specialists who oppose the method. the fact remains that thus far neither group has established rational and scientific reasons for or against the method. It is not argued that in selected cases in which surgical tonsillectomy is for some reason contra-indicated, or for the eradication of tonsil stumps, for secondary procedures or for the destruction of tonsillar neoplasms, electrocoagulation is an ideal procedure. As a routine means of eliminating tonsils, neither coagulation, desiccation, and for that matter the x ray, have sufficiently passed muster to be accepted as rational and scientific substitutes for tonsillar removal.

Modifications of the gradual destruction of the faucial tonsils have more recently been advanced. Instruments have been devised for what have been termed coagulation-dissection, coagulation-enucleation, etc. In the main these procedures entail a complete removal of the tonsils at one sitting by the usual surgical technic save that the severing of the organ is effected by surgical diathermy. The latter tends to eliminate bleeding because of the searing of the blood vessels. The lymphatic channels are also shut off, so that in patients in whom much local infection exists, a dispersion of local infective elements is minimized. This method of tonsil removal seems to mark a definite advance and with the further development and perfection of instruments and technic, more common adoption may be anticipated.

The whole problem is still in more or less of a chaotic state. It might be well for the opponents to help solve it by some actual experimentation on their own part instead of attempting constantly to reject the procedure purely on theoretical grounds or on the basis of unsound and biased opinions. There are those who are never willing to accept something new until somebody else has perfected it for them. There is no doubt that surgical diathermy has come here to stay, that it has proved to be of definite scientific value for a variety of surgical indications, that it has rationally replaced the cold knife for the destruction of malignant neoplasms, and that there still remain numerous conditions for which further laboratory and clinical experimentation will demonstrate its real therapeutic efficiency. Whether or no, surgical diathermy, in its simple or modified form, will eventually replace surgical tonsillectomy altogether, time alone will divulge. —A.R.H.

ERROR

In the June issue of the Archives, page 274, an article entitled "Council on Physical Therapy of American Medical Association" by H. J. Holmquest, M.D. (M.E.) should have read H. J. Holmquest, B.S. (M.E.)

THE STUDENT'S LIBRARY

BOOKS RECEIVED

This column is devoted to acknowledgment of the books received. Such acknowledgment must be regarded by the sender as sufficient recognition of the courtesy until time and space permit selections to be made for review.

LEITFADEN DER ELECTROTHERAPIE," by Dr. *Fritz Kraus*. Assistant fur Physikalische Therapie an der Deutschen Psychiatrischen Universtatsklink in Prag. 48 pp. Publ. Julius Springer, Wien. Price, 2.80 reichsmark.

OPERATIVE SURGERY, by *J. Shelton Horsley*, M. D., F. A. C. S., Attending Surgeon, St. Elizabeth's Hospital, Richmond, Va. Illustrated by *Miss Helen Lorraine* Third edition. Pp. 893, with 756 original illustrations. Cloth, price, $15.00. St. Lous: C. V. Mosby, 1928.

INJURIES AND DISEASES OF BONE. By *Sir William Ireland de C. Wheeler*, (Mod) B. A., M. D., (Dub. Univ.), F. R. C. S. I., F. A. C. S. (Hon), Surgeon to Mercer's Hosp., and the National Children's Hosp., Dublin, past pres. Royal College of Surgeons, Ireland, etc. Pp. 148 with 100 figures and illustrations. Cloth. Price, $4.00. New York: William Wood & Co., 1928.

TREATMENT OF DISEASE IN INFANTS AND CHILDREN. By *Hans Kleinschmidt*, M. D., Professor of Pedriatrics, Univ. of Hamburg. Authorized translation of the fifth German edition with additions by *Harry M. Greenwald*, M. D., Attending Pediatrician to the United Isreal Zion Hosp.; Consulting Physician to the Hebrew Infant Home of Brooklyn, N. Y. Pp. 359. Cloth. Price, $5.00. Philadelphia: P. Blakiston's Son & Co., 1928.

THE SIMPLE GOITRES. By *Robert M. Carrison*, C. I. E., M. D., D. Sc., LL. D., F. R. C. P., Associate Fellow of the College of Physicians, Philadelphia; Laureat de L'Academie de Medicine, Paris; Lieut.-Col. Indian Medical Service; Pasteur Institute, Coonoor, S. India. Pp. 106 with 143 figures, photomicrographs and illustrations. Cloth. Price, $4.00. New York: William Wood & Co., 1928.

THE DUODENUM: Medical, Radiologic and Surgical Studies. By *Pierre Duval, Jean Charles Roux* and *Henri Beclere* of the Surgical Clinic, Faculty of Medicine, Paris. Translated by *E. P. Quain*, M. D. Cloth. Pp. 212 with 127 illustrations. Price, $5.00. St. Louis: C. V. Mosby, 1928.

BOOKS REVIEWED

REVIEW OF HAND ATLAS DER CYSTOSCOPIE. *Kneisl*. Publishers, Georg Thieme, Leipzig. 1926.

This cystoscopic atlas combines drawings depicted in the first edition published in 1907, together with a practically equal number of new plates which bring this edition up to date.

These plates are accurate and true representations of the cystoscopic picture, the coloring adding markedly to their value. The plates showing the treatment of bladder tumors by fulguration and the effect on the tumor mass are very valuable.

Ureterocele, bladder diverticula and cellules are beautifully shown.

The various steps in the insertion and passage upward of a ureteral catheter are accurately pictured.

Careful examination of these plates will demonstrate their accuracy to any experienced urologist.

This atlas will be a distinct aid to the beginner in cystoscopy and will help the experienced urologist in visualizing bladder pathology.

RADIOLOGIE—I. Introduction, Technique des Rayons X, Radiodiagnostic. By *A. Beclere* and *P. Cottenot*. Pp. 423. 250 illustrations. Published by Norbert Maloine, Paris, 1928.

The introduction, by A. Beclere, is a very interesting discussion on the development of the x ray and its uses in physics and medicine. The physics and mechanics of the roentgen ray are very clearly explained and an adequate description is given of the technique of radiography and the value of the diagnostic and therapeutic aspects of the subjects.

The section dealing with diagnostic and radiographic roentgenology was written by P. Cottenot. In the section on diagnosis, which covers about 300 pages, the author has managed to include a tremendous amount of information. While it is true that a number of subjects, like rickets and scurvy, are treated rather briefly, still even the well trained roentgenologist would be surprised by the many valuable points in diagnosis suggested in this section. It cannot be denied, however, that as a whole these chapters of the text are more fitted

for the use of the general practitioner who wishes a good foundation in roentgenology. The section on technique is excellent. Here more than in the previous division, the trained specialist could read with great benefit. It is a discussion of the different techniques to be used in the visualization of the different organs. Also the character of the various tubes and machines are fully discussed. Of particular interest are the two chapters on the different methods of calculating therapeutic dosage, the dangers to technicians, and the methods of overcoming them.

The 252 illustrations are very good. Most of them clearly visualize the points which the author wishes to make. This text is recommended to the general practitioner as well as the specialist in roentgenology.

N. Beitlin, M. D.

APPENDICITIS. By *Hubert Ashley Royster*, A. B., M. D., Surgeon to Rex Hospital, Surgeon-in-Chief, St. Agnes Hospital, Raleigh, N. C.; former President Southern Medical Assn. Surgical Monograph. Cloth. Pp. 376, with 56 illustrations. New York: D. Appleton & Co., 1927.

In the compilation of this monograph on appendicitis previous monographs have been freely used and the current literature particularly of the past five years has been reviewed. Extensive bibliographies follow each division of the book.

The material is presented in a very didactic manner. Preceded by a historical sketch the anatomy, physiology, etiology, pathology, symptomatology, diagnosis, complications, prognosis and treatment are individually considered. Two main varieties of appendicitis exist, the acute and the chronic. The symptomatology in the acute types is taught to be more or less definite, being in order of frequency and importance, pain, vomiting, tenderness, rigidity, fever and leukocytosis. Chronic appendicitis has no such orderly and consecutive array of symptoms. Its presence is most difficult to determine. It is interesting, however, to note the rarety of these textbook pictures; but assuming the diagnosis made, Dr. Royster warns us that the prognosis depends almost entirely upon the time of operation. " . . . the first warning of nature in appendicitis is the first attack and, once the diagnosis is established, the removal of the appendix at the earliest possible moment betokens recovery and permanent cure." The question of when to operate settled, how to operate is next. This can best be settled by evaluation by the surgeon of his own opinions, tastes and predelections. In the process of treatment, the same old question—to drain or not to drain—must be met. For the author, the old motto of Tait, "when in doubt, drain," could be reversed to read, "when in doubt, don't drain." It is his opinion "the doubtful cases are those that need no drainage, as a rule; otherwise we would not be in doubt, but would decide frankly and freely to drain."

Presenting the hypotheses of our most renowned surgeons, the author makes them doubly valuable by incorporating the principles forming the basis of his surgical judgment, the result of years of experience and keenest observation. For the younger surgeon, this monograph is particularly valuable, summarizing under one cover the experiences and advice of the masters.

INTERNATIONAL CLINICS. Vol. III, Series 37. By leading members of the medical profession. Edited by *Henry W. Cattell*, A. M., M. D. Cloth. Pp. 311 with 49 illustrations. Philadelphia: J. B. Lippincott, 1927.

The material included in this quarterly is divided into seven parts. In the first section under diagnosis and treatment, *Theobald Smith* discusses "The Passing of Disease from one Generation to Another." "Electrocardiographic Study of the Various Forms of Heart Block" are presented by *J. M. Wilson*. "The Types of Colitis" are given by *T. R. Brown*. "Clinical Aspects of Thrombo-Angitis Obliterans" receive the attention of *Wm. A. Steel*. "Differential Diagnosis and Treatment of Gallbladder Disease" are presented by *I. W. Held* and *I. Gray*, followed by a discussion on "Peptic Ulcer" by *John Philips*. "The Virus of Herpes Simplex" occupy the attention of *C. E. Simon*, while "Field Investigations of the U. S. Public Health Service" are outlined by *A. M. Stetson*. The various phases of "Meckel's Diverticulum" are enumerated by *L. F. Barney*, followed by *Doctor Nonne* of Hamburg on "Anemic Spinal Diseases."

Separate distinction is given *H. I. Goldstein* and *H. U. Goldstein on* "Pneumococcus Meningitis and Endocarditis," while *H. C. Masland* presents the only surgical article, "Deformity Correcting Splints for Fractures of the Long Bones."

Obstetrics has an interesting presentation on "Keilland Forceps and Vesicovaginal Fistual" by *D. Longaker* and *W. F. Harriman*, followed by a neurological article by *E. D. Friedman* on "Pallanaesthesia."

"Greek Medicine" is interestingly prestented by *John R. Oliver*.

The post-gradute section is formed by two articles, one by *H. W. Cattell*, "Medical Questionnaires;" and *W. S. Cornell*, "Personal, Community and Industrial Hygiene."

The usual form, organization and accepted authorities are used in the compilation of this quarterly postgraduate study.

INTERNATIONAL ABSTRACTS

Radium in the Treatment of Uterine Hemorrhage. Harold Swanberg, M. D. The Rad. Review, March, 1928.

This is a comprehensive survey of a subject which is still on the borderline of acceptance, so far as therapy is concerned. The causes of uterine hemorrhage and the indications for radium therapy are given in more or less outline form. The contraindications are likewise stated. Swanberg's radium applicator and the technic for its use are described in detail. The results of radium treatment are mentioned and radium versus surgery fully discussed.

The summary and conclusion follow:

1. Radium therapy is the method of election in a large percentage of uterine hemorrhages.

2. Success of radium treatment depends on (a) accuracy of diagnosis, (b) proper applicator and technic of application, and (c) adequate dosage.

3. Radium is not a competitor to surgery, each being useful methods which require intelligent selection for their use.

4. The application of radium in uterine hemorrhage is comparatively simple, and many times may be successfully made by the physician or surgeon under the supervision of an experienced radium therapist.

Radium is one of the most valuable additions to the gynecologists' armamentarium today. It has enabled him to manage without operation a large percentage of uterine hemorrhages. It is usually much easier to persuade a patient to submit to a simple procedure such as the application of radium, than to gain her consent to undergo a major operation. Many women, from fear of the knife, suffer from some type of uterine hemorrhage and postpone consulting a physician until wrecked mentally and physically. With a better understanding of the wider use of radium, fewer women will be ordered to a hospital for what is considered a serious operation. The knowledge that a simple radium application will frequently offer relief (where a mutilating operation was indicated only a few years ago) should make women anxious to consult physicians early.

The Painful Shoulder. James Morley Hitzrot, M. D. Minnesota Medicine, March, 1928.

The conditions which produce painful shoulder are classed in four major groups: (1) trauma, (2) infection, (3) cervicobrachial neuritis, (4) new growths. The first two have many subdivisions. The etiology, pathology, and symptoms are classically detailed.

In the discussion of treatment, Morley states:

"In the cases with deposits in the tendon we have the acute cases with severe pain, rapid atrophy of the deltoid and complete disability. For these complete rest, preferably in bed, a sedative, morphine, if necessary, and hot moist applications locally, give the most relief. As a rule the acute symptoms subside in from three to seven days. In my experience dry heat, diathermy and massage increase the pain without benefiting the patient otherwise and are not indicated. Operation may be indicated (vide infra).

"In a large majority of cases the acute symptoms subside and recovery is gradual, aided by heat, massage and exercises and the gradual abduction method suggested by Brickner. In some the pain becomes of the chronic type.

"In the chronic cases with deposits, abduction, massage and exercises usually give relief. When recurring attacks occur, especially with increase in the deposit in the tendon, operation is indicated and possible sources of infection should be carefully sought."

Recent Advances in the Therapy of Tuberculosis. G. F. Fahndrich, M. D. Jour. M. S. M. S., April, 1928.

Fahndrich summarizes and evaluates the important therapeutic agents in tuberculosis. After considering chemotherapy and artificial pneumothorax, some space is devoted to sunlight therapy. The true value of actinotherapy in the treatment of the various forms of tuberculosis is neither sufficiently recognized nor admitted. There are many adverse opinions expressed as to its value in pulmonary tuberculosis.

Actinotherapy acts by stimulation of the central nervous system via the nerve endings in the skin, and also through the blood stream. The principal sources of artificial actinotherapy are the carbon arc, the quartz mercury vapor tube, and the Tungsten arc. All of these have their respective values, and separate indications in different cases, according to the nature, extent and situation of the tuberculous lesions, the stage of the disease and the patient's "resistance" to it. No source is of universal value. The matter of dosage is one which the author stresses considerably. It is probably better to under-radiate the patient than to over-radiate him for the purpose of pigmentation. According to Fahndrich, tanning is not a therapeutic index. He continues by showing the deleterious effects on the skin cells of over dosage.

While the proper dosage of light has not yet been satisfactorily established, it is well to remember that a small dose will stimulate the tissues exposed, and that if a safe dose is exceeded, healthy tissue may be over stimulated or even destroyed.

Radium Therapy in the Treatment of Benign and Malignant Conditions of the Eye. V. T. Lenth, M. D., and Wm. L. Brown, M. D. The Rad. Review, March, 1928.

Pathological conditions of the eye have yielded sufficiently satisfactory results from radium irradiation to warrant further application and study in this specialized field. It is not a panacea, but it certainly has its place in selected groups of cases included in which are pterygia, sarcomata, obstinate catarrhal conditions, and epitheliomata, especially of the eyelids. Case reports are given to verify the indications mentioned.

It is contended, however, that early intensive initial treatment is necessary to secure the best results. The eye will tolerate heavy radium irradiation when properly managed. Earnest co-operation of the patient is highly essential. Satisfactory end results are largely dependent on the promptness with which patients return for subsequent treatments and observation.

Goitre and Its Treatment by Physical Therapy. William Benham Snow, M. D. Physical Therapeutics, May, 1928.

Snow quotes numerous authorities on the subject of goitre, emphasizing particularly the statements of Sajous, Brams, Solomon Solis Cohen, and others. Several interesting case histories are related by Snow with the assertion that for more than twenty-five years these cases have responded with such uniform results that he invites an investigation of the non-operative method outlined in this paper. The conclusions are:

1. Exophthalmic goitre is a symptom complex originating from various causes affecting the thyroid gland through maladjustments of the endocrine chain.

2. The symptom complex involves the thyroid in such a manner that excessive thyroxin is thrown into the circulation, so affecting the physical conditions that the symptoms are those of thyroxin poisoning. The thyroid gland normally holds excess secretion, which responds to the call from without. Hence the call must originate elsewhere.

3. The indications for treatment will depend upon the sources or cause that have induced an increased thyroxin output. Various sources of possible derangement must be investigated in every case, as to whether there are derangements of the sex glands, focal infection, impaired circulation in the splanchnic area, or whether there may be a history of shock or fright which may have originated the syndrome.

4. The indications for treatment will be determined by the diagnostic findings in each case and will be directed to the removal, when possible, of the maladjustments or derangements discovered.

5. The author's early experience with the static current demonstrated its effects upon disturbed metabolism, so effectively relieving the syndrome of thyroxin poisoning that it has since played an important role in the treatment of these cases.

6. The x ray is indicated as a joint means in the early treatment of some cases, to check the secretion of thyroxin and so relieve the nervous syndrome as evidenced by the tremor. The x ray will forestall the use of surgery as a more accurate means of regulating the output of thyroxin.

7. Neither the x ray nor surgery employed singly constitute a scientific treatment, because the control of thyroxin secretion does not embrace the removal of conditions that have induced the imbalance in the endocrine chain. The treatment, therefore, should include the employment of measures that will correct the causes that have led to the condition and restore to normal the metabolism throughout the organism.

8. For the accomplishment of this result in the author's experience the static modalities, high frequency current, and mechanical vibration play an imprtant part.

Some Clinical Experiences with Physical Therapeutics in the Practice of Pediatrics, with Special Reference to the Use of Radiant Light and Heat in Treatment of Broncho-pneumonia. Margaret R. Reynolds, M. D. Physical Therapeutics, May, 1928.

With the exception of ultra violet radiations, relatively little use has been made of physical therapy in the field of pediatrics. By citing case reports the author suggests some possible applications of different physical agents in the treatment of certain diseases of children. Ultra violet radiations gave satisfactory results in rachitis and in various types of skin diseases.

Gratifying results were also obtained by giving ultra violet treatments to a small series of premature infants, followed from two weeks of age until they were over a year old. Radiant light and heat were used in conjunction with ultra violet radiations in the treatment of infected smallpox vaccinations. Diathermy, too, can be used to advantage in treating young patients. Its application in various joint and bone conditions is the same as with adults. Forbes has recently reported favorably on the use of diathermy in 96 cases of pneumonia in young infants. Radiant light and heat are strongly advocated by Reynolds for acute respiratory infections, rhinitis, bronchitis, broncho-pneumonia and also for otitis media or cervcal adenits.

The Use of Diathermy in the Treatment of Pneumonia. N. J. Seybold, M. D. Ohio S. M. Jour., March, 1928.

Diathermy when properly administered in pneumonia with regard to other conditions is devoid of danger. It is never an antagonist, but always an ally. It is the only measure that will place heat with safety and uniformity between two equal surface contacts. Heat used as a therapeutic measure increases the local tissue resistance, increases cell metabolism, increases the cell nutrition, and increases blood supply to the part, thereby effecting the absorption of unorganized exudates. The blood pressure, systolic and diastolic, falls slightly after a diathermic treatment in pneumonia. The respiratory rate becomes slower and cyanosis is decreased. I have

noted in some of the pneumonias that cyanosis disappeared within ten minutes after beginning treatment.

Failure of diathermy early in the disease to bring noticeable symptomatic relief indicates an unfavorable prognosis.

The temperature generally dropped by lysis.

Diathermy is a distinct and valuable aid in the treatment of pneumonia, can be used in all cases, is not a specific, and all other usual measures should be taken.

Rheumatoid Arthritis. Mary L. H. Arnold Snow, M. D. Physical Therapeutics, May, 1928.

1. Rheumatoid arthritis is a toxic polyarthritis characterized by severe pain and invariably sooner or later bilateral involvement of the smaller joints, limited motion, later a marked loss of strength and lost morale.

2. Its cause is gastrointestinal, complicated in some instances by a focal infection, possibly streptococcus viridans being many times the causative factor.

3. Abduction of the fingers at the metacarpophalangeal articulation, due to muscular spasm attendent on pain, is distinctive of rheumatoid arthritis.

4. Bodily tone is improved by the use of radiant light and heat, or preferably by the carbon arc lamp.

5. Hepatic stasis is overcome by the static wave current or by the use of diathermy.

6. Lymph stasis is relieved by the use of radiant light and heat, mechanical vibration, or the static sparks and brush discharge.

7. Muscular tension is treated with the static wave current followed by static sparks and mechanical vibration. The d'Arsonval current may be used over the fingers.

8. Vasomotor disturbances and especially derangements of blood pressure are favorably affected by mechanical vibration.

9. Regulation of life habits, environment, exercise, and diet are necessary. The diet must be a properly balanced low protein diet. Exercise frequently, yet short of fatigue, is one of the most important duties in the life of the patient. High colonic flushings should be routine treatment. The use of the static wave current per rectum or the conical vibratode is indicated in the treatment for a tight sphincter.

10. Gastroptosis and enteroptosis require a proper rigid support. Kinks or malalignments are treated by the sinusoidal wave and the wave generator.

Physical measures do not accomplish the impossible. Only the most advanced cases resist improvement, although made more comfortable. In all other cases benefit or restoration so as to resume the normal activities of life follows treatment as outlined.

The Effect of Extremely Hot Baths in Experimental Syphilis. Further Studies. Jay Frank Schamberg, M. D., and Anna Rule. Arch. of Dermat. and Syph., April, 1928.

The authors have derived certain impressions from the treatment of these patients with hot baths, but they are merely tentative and may be reversed by further experience. If the quantitative Wassermann reaction by the Kolmer method is compared before and after treatment, it will be found that in nearly all instances the complement fixation test had become somewhat weaker after the treatment. In nearly all of the cases, the eruption tended to undergo regression after the treatment with baths. This was more evident with tertiary lesions than with secondary manifestations. In case 7, four injections of bismuth after four baths were followed by a negative blood Wassermann reaction in a patient who primarily had a moderately strong Wassermann reaction.

The first endeavor was to study the effect of the hot baths alone on early and late cutaneous syphilis. It was not anticipated that this treatment of itself would suffice, but that it would have to be conjoined or followed by the usually approved methods.

The next step will be to determine whether the associated use of very hot baths with antisyphilitic remedies will lead to shorter or surer results, both in early syphilis and in tertiary syphilis and neurosyphilis.

In connection with the use of very hot baths, it is interesting to note that the natural hot springs at Kusatsu in Japan, in which persons bathe for from three to four minutes in water of a temperature of from 113 to 125 degrees, are said to be used particularly for the "illness that destroys the nose."

In conclusion, the authors emphasize the opinion that deductions cannot be drawn from the clinical results already referred to. They have been inserted to satisfy the curiosity that might be aroused by reference to a clinical trial of the method, rather than to interpret the results thereof. Conclusions can be arrived at only after a much more extended investigation.

The Ultra Violet Ray and Its Use in Tuberculosis, with Case Reports. Garnett Nelson, M. A., M. D. Virginia Med. Monthly, Vol. 55, No. 2, May 1928.

This paper is justified by a belief that certain cases of tuberculosis can be readily cured by light, while other cases that may in time respond to other methods will, if light is also used, respond more promptly and with better final results. An accurate knowledge of three things is necessary: The tissue and chemical reactions to the tubercle bacillus, the tissue and chemical reactions to light, and the relation of each to the other, that is, the effect of the reactions of light on the reactions to the tubercle bacillus, whether beneficial or injurious.

The author goes into the history of light therapy. He then considers the question: Is the effect that the ultra violet ray may or may not have on the skin and its blood vessels and nerves a matter of much importance? Then follows some of the physiologic effects of ultra violet light on the skin, hemoglobin, metabolism, blood chemistry, etc. Emphasis is made that too much stress must not be laid on the local pathology for fear of losing sight of the fact that tuberculosis is a constitutional disease. The effects of the actinic ray are fairly parallel to the effects of tuberculin, namely a local, a general and a focal reaction.

The indications and contraindications for the use of actinotherapy are discussed and authorities quoted. Case reports are also given.

Diathermy. Norman E. Titus, M. D. Jour. M. S. of New Jersey, May, 1928.

Titus reviews the subject of diathermy, and summarizes what he considers the most important aspects, under five headings, thus:

1. Diathermy is an electric current oscillating at a frequency of from one to three million times per second.

2. Diathermy is administered by means of electrodes placed on opposite sides of the part to be treated. Incidentally, care should be taken that the edges of the electrodes are no nearer each other than are the centers, because electricity will always take the shortest path and if it can go from edge to edge, it will do so without going through the interposing tissues.

3. Diathermy causes a definite heating of the interelectrode tissues, varying with their resistance. Consequently, bone will heat to a greater degree than will muscle. This fact should be kept in mind.

4. Diathermy is indicated wherever induction of a physiologic hyperemia will bring about a reaction that may be expected to increase the resistance or enhance the physiologic function of a part.

5. Diathermy is in no sense a cure all; it will not stand on its own feet as a single treatment for any condition, and it gets its best results when applied with medical common sense.

Skin Cancer-Diagnosis and Treatment. Wm. Howard Harley, M. D. The J. of the M. A. of Georgia, Nov., 1927.

Numerous case histories are introduced to show the comparative value of radium, x ray and electrocoagulation for different types of cancer based altogether on pathogenesis and location. A good deal of comment is made on the problem of diagnosis and prognosis of these different types. The author's statement on treatment is quoted because of its appropriate interest.

At this time, it is well to state that any abnormal lesion of the skin, which is subjected to trauma, should be removed. Any lesion which is irritated, infected or growing and does not respond to simple treatment in three to six weeks should be looked upon with circumspection. Prophylaxis is always easier than cure. The common treatments in vogue are caustics, surgery, endothermy, electrodesiccation, x rays and radium. No single treatment is suitable for all cases. Better results are obtained many times when two or three agents are used jointly. The features of the case should decide the treatment to be used.

The writer's experience has been mostly with endothermy, electrodesiccation, x rays and radium. In basal cell growths it is seldom that any agent, other than radium, is necessary. In squamous cell tumors, under four per cent novocaine, all evident signs of the local growth and a surrounding zone of healthy tissue is destroyed by electrodesiccation. The regional lymph glands are treated with x rays or radium. If the glands are found to be involved in the beginning, the joint use of surgery and radium offers the best hope for a cure. Patients who have had basal cell tumors should be observed at intervals for a minimum of two years. Those who have had squamous cell tumors should be observed at intervals for a minimum of three years.

Believing that radium is the nearest approach to an ideal treatment for the majority of cancers of the skin, I wish to enumerate its advantages:

1. Absence of infection.
2. Absence of shock (mental and physical) to nervous and elderly people.
3. Hospitalization not necessary.
4. No disturbance of daily occupation.
5. Ability to concentrate the treatment at desired point.
6. Eliminates danger of electric shocks and burns.
7. Movements of patient do not disturb treatment.
8. Good cosmetic result.
9. Last and best, the treatment is painless.

This paper was prepared with the thought in mind, of making it practical for the majority of the physicians present. For this reason a discussion of biopsy and microscopial diagnosis was purposely omitted.

Diathermy and Physical Agents in General Practice. H. J. Kooiker, M. D. Minnesota Medicine, May, 1928.

Massage and exercise as well as the newer electrophysical agents are considered. The writer stresses the three reactions stated by Titus in the use of physical forces: formation of heat, the effects of mechanical motion and exercise, and some weak but potent chemical reactions. Some facts concerning static electricity are also cited.

Classical beliefs regarding diathermy are reviewed and the application of this current detailed to some extent. Physical therapy itself is a mode of therapy for use in every department of medical practice in which, and to the extent of which it is applicable. A few conditions to which physical therapy may be considered the only means of giving benefit are pointed out.

Carcinoma of the Thyroid Gland with Special Reference to Surgery and Irradiation. Harry W. Bowing, M. D. The Rad. Review, March, 1928.

The early diagnosis of malignancy and the thorough application of surgical and irradiation methods should prove efficacious, and in certain cases cure may be expected. In the late cases, adequate irradiation is indicated and palliation can be expected.

The importance of early removal of adenomas of the thyroid gland by surgical measures cannot be overemphasized, especially since the procedure may be classified as prophylactic in the prevention of carcinoma of the thyroid.

Urinary Incontinence of Women. Deutsche Med. Wochenschr., No. 19, 1927.

Prof. L. Gasper proposes the treatment of urinary incontinence of women by electro-coagulation of the sphincter vesical. The contracting scar, resulting from this procedure insures closure of the bladder. The technic of this operation, which can be done under local analgesia, requires the introduction of a suitable cystoscope, exposing the sphincter muscle, after which a diathermy electrode ending in a small button is pressed firmly to each side and below the cystoscopic lumen until the appearance of gas bubbles indicates the completion of the coagulation. The method is entirely free from danger. In cases of a purely surgical character, such as fistulae of the bladder or ureter involving also the vagina, or extensive lacerations of the urethra, operation by the classic methods is the treatment of choice, but the diathermic method is to be preferred in stretching of the urethra through childbirth in prolapse of the urethral mucous membrane and in atrophy of periurethral tissue.

Occasionally electro-coagulation may be indicated also in disturbances due to nervous conditions even of a central character.

Cholecystographic Studies After the Administration of Some of the Popular Cholagogues. William H. Stewart, M. D., and Eric J. Ryan, M. D. Am. J. of Roent. and Rad. Therapy, April, 1928.

Of the 14 substances used a most constant response was obtained from oleic acid.

Olive oil pure or emulsified showed some emptying power.

With the exception of oleic acid none of the drugs used caused as great or as rapid emptying as a simple meal. Singularly enough, this fact was stated by B. Naunyn in his famous monograph on "Cholelithiasis," published in 1892, and his deductions were entirely from clinical observations. The act of digestion is the necessary factor in gall-bladder emptying.

No reaction whatever was obtained from the following: castor oil; sodium salicylate; bile salts; sal cathartic; seidlitz powder; sodium phosphate.

Where podophyllin and dilute hydrochloric acid were given patients with dilatable gall-bladders the bile content was apparently increased.

Calomel and pitutrin, although not causing emptying, did appear to excite the gall-bladder to activity as was seen in changes in size, form and concentration. In some of the patients an actual peristalsis was suggested.

The Role of Glass in Relation to Light Treatment. F. E. Lamplough, M. D. The Brit. J. of Tuberculosis, Vol. XXII, No. 2, April, 1928.

Glass may be said to occupy a place of importance second only to that of metals in its influence on the comfort and well-being of mankind. Apart from the large number of different compositions of glass which have been produced to meet the exacting demands of opticians, glasses having special chemical or physical resistance have been developed to fulfill the requirements of laboratory workers and illuminating engineers. Whilst the production of window glass which is as free as possible from color, or which is finely colored for decorative work, has received continual attention, no efforts have been made until very recently to alter its composition with a view to giving it special transparency or opacity to the invisible radiations of daylight beyond the red and violet end of the sun's spectrum. Lamplough conducted his researches in 1924. He received encouragement from Professor Leonard Hill and also from Dr. C. W. Saleeby, and others. Early in 1925 the first full-scale melting was made of a new window glass (designated "Vita") specially pervious to the therapeutic rays. The scientific principles underlying the production of the glass were established, and later research has improved still further the quality of the glass.

The optical properties are described in detail and several spectral drawings and transmission curves for vita and ordinary glass are contained in the article. Biological tests were performed in the zoological gardens, the first successful test was observed in an experimental monkey house at the London Zoological Gardens. The value of the glass was so evident that practically all the animal houses were reglazed by 1927.

In June, 1925, the first scientific biological test of the effect on the health of human beings was carried out under the control of the School Medical Officer of Smethwick Borough Council in one of the council schools. Every care was taken to secure reliable results. The Council on Physical Therapy of the American Medical Association carried out a careful series of tests near Boston during January and early February, 1927, to determine the biological value of the transmission of the extreme ultra violet rays of the sun's spectrum.

Pulmonary tuberculosis furnishes the most important of the very few conditions in which great discrimination is required in determining whether this remedial treatment may suitably be employed. Where exposure to the ultra violet rays of natural light is considered desirable, whether direct sunlight is used or the comparative coolness of the radiation from the north sky, a glass transparent to such rays enables treatment to be given in open or closed wards without the great inconveniences associated with exposure carried out entirely in the open.

Radium Treatment of Epulis. Albert Soiland, M. D., Wm. E. Costolow, M. D., Orville N. Meland, M. D. The Rad. Rev., March, 1928.

This growth usually appears as a red, pedunculated mass growing from the alveolar process of the jaw, often underneath the canine and incisor teeth. The growth is covered with the mucous membrane of the mouth and is composed of fibrous tissue and giant cells.

It is thought to develop from the periosteum in connection with the root of a decayed tooth (Adaine).

In the cases of epulis observed by the authors there has not been any evidence of metastasis. The response to radiation has been complete in every case although more rapid in some than in others. The tumors which responded more slowly were probably the dense fibrous tissue type of epulis, with few giant cells.

The authors believe that radium should be used exclusively in the treatment of epulis. A brief review of eight cases is cited.

The X Rays and Radium in the Control of Cancer. George E. Pfahler, M. D. The Rad. Review, March, 1928.

After a very comprehensive discussion of the subject in which various phases are analyzed, Pfahler arrives at the following conclusions:

1. Practically all cases of cancer of the skin can be cured if treated while they are only cancers of the skin.

2. Many cancers of the mouth can be prevented, and about 75 per cent can be cured if thoroughly treated by radiation in the earliest stage.

3. Cancer of the breast can be cured by operation alone in 70 to 100 per cent of cases treated while it is strictly confined to the breast. This only applies to about 20 to 25 per cent of the cases as they come under expert observation. Therefore, the other 75 to 80 per cent must have operation and radiation combined to have a 44 to 46 per cent chance.

4. According to the statistics from the Doerlein clinic as high as 80 per cent of the carcinoma of the cervix can be clinically cured if treated in the operable stage and treated thoroughly and skillfully by radiation, but when the average case is considered, the chance of recovery is only about 20 per cent. Irregular bleeding, any unnatural discharge, or pelvic pains, should receive most careful investigation by the family physician.

Radium Treatment of Cavernous Hemangioma and of Epulis. A. Strauss, M. D. Am. J. of Rad., Vol. XIX, No. 3, March 1928.

Two cases of cavernous hemangioma of the liver were treated with unfavorable results.

It is pointed out that it is the aim of the therapist to induce by radium treatments what nature or disease can bring about in the arteries and veins. Numerous cases are cited and photographs shown of before and after treatment. One is a case of hemangioma of the eyelid. Another is a case of hemangioma of the neck. Still another is that of hemangioma of the nose. A case of epulis is illustrated. No recurrence is noted after six years. In all the author presented four cases of epulis.

These cases are treated by insertion of radium needles from the outer edge to the base. In the cases recorded the time varied from 180 to 230 mg.-hr.

The New Urethral Electrode. Arthur J. and Monroe E. Greenberger, M.D. The Urol. and Cut. Rev., Feb. 1928.

For the past four years the authors have been treating folliculitis by electrocoagulation with a "home made rigid electrode similar to the one now being made for them by the Liebel-Flarsheim Company. The procedure has been to "bury" the active point of the electrode in the follicle and then about 1500 ma. of current is turned on for a few seconds. The biterminal method being preferred the patient holds an inactive handle electrode. Two per cent novocain is retained in the anterior urethra for ten minutes prior to urethroscopy. The electrode (illustrated by diagram in original article) is easily manipulated through the McCarthy or Young endoscope. A number of papillomas of the anterior urethra have been successfully treated with this electrode.

Radium Treatment of Tonsils and Other Lymphoid Tissue in the Throat. Francis H. Williams, M. D. Am. J. of Roent. and Rad. Therapy, April, 1928.

The radium is applied to the tonsil, for a few minutes, in the container, so designed that the beta rays can issue in the direction of this gland only; those that would be harmful near the surface are excluded by an appropriate filter and the remainder are absorbed within the tonsil and act on the tissue it is desired to be rid of.

The dosage can be exact. It is not necessary to eradicate the whole tonsil, but all the diseased lymphoid tissue should be got rid of.

The method is safe and efficient and the recurrences few, whereas after tonsillectomy they are frequent.

Radium treatment is not subject to the complications that may accompany or follow operation.

The occupation is not interrupted—an economic saving.

Radium has a wider field of usefulness than that covered by tonsillectomy in that it can be employed for patients who are not good operative risks and, what is also important, for treating diseased lymphoid tissue in the pharynx and other parts of the throat.

When radium treatment is available, properly carried out, and its advantages better known, tonsillectomy, as a rule should not be done.

Setting Fractures by an Electromotive Device. John J. Moorhead, M. D. Am. J. of Surgery, Vol. IV, No. 5.

This device, based on this initial experience, is worthy of further trial in selected cases, because:

1. It is safe.

2. It permits automatic, regulated, immediate reduction, with or without anesthesia, with or without roentgenographic control.

3. It is adapted to early cases (within the six hour "incubation" period) and to the late or unreduced group, and to some of the group classed by the writer as the "irreducibles" in which prolonged traction, skeletal traction or open reduction has hitherto been the remedy.

4. Because of simplicity and exactitude, it will encourage early reduction and retention and thus put a larger group at once into the finished class, due to this one act of definitive reduction.

5. A plaster of Paris casing can be applied above and below the fracture site, and this gap can be later filled in after the motor controlled reduction has been obtained. In this way any pressure on the limb can be prevented as the lower end of the "harness" is buckled over the plaster casing and the upper part of the "harness" is distant from the fracture site, acting in effect like a perineal post of a fracture table.

This apparatus is made by the Articulator Company of Detroit, and in a proposed modified form the value of the appliance will be enhanced for the purposes above described. In the vicinity of New York it is handled by the Hospital Supply Company.

Radiant Light in Gonorrheal Ophthalmia. J. J. P. Armstrong, M. D. Physical Therapeutics, April, 1928.

In this disease there is inflammation, swelling, more or less stasis, discharge of pus with a channel of drainage, and gonococci. Applying radiant energy there is created a hyperemia which opens the channels of drainage, relieves the stasis, and brings in all of nature's own antibactericidal resources to overwhelm the already weakened germs. There is also an antiseptic effect directly from its heating action upon bacteria, which cannot thrive except within certain temperature limits.

Radiant light and heat are of great assistance in the treatment of gonorrheal ophthalmia. The ease of application and quick results appeal to the physician. The author's technique is given in detail.

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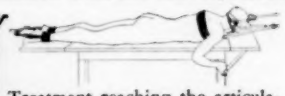

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